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THE THERMOSTABILITY OF PITUITARY EXTRACTS IN RELATION TO KETOGENIC ACTIVITY*

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BURN and Ling¹ first demonstrated in the fasting rat an increased excretion of acetone bodies following the administration of a simple alkaline extract of pituitary tissue. Subsequent investigations^{2, 3} have shown that heat-treatment inactivates such preparations. The negative results recently reported by Shipley and Long,³ obtained with heat-treated pituitary extracts, stimulated us to a further study of the ketogenic properties of various pituitary fractions. We realized that in our recent communication,⁴ in which it was shown that ketonæmia could be produced by certain extracts which had been heat-treated in aqueous alkaline medium, we had not perhaps sufficiently emphasized the fact that by far the major part of the ketogenic substance present in the original gland tissue had been removed from our extracts during the fractionation procedures to which they had been subjected. We have turned our attention, therefore, to a study of the ketogenic activity of numerous protein fractions which have been obtained and which have been assayed for growth, thyrotrophic, and various other activities. It was found that excellent ketogenic effects could be obtained with almost any protein fraction irrespective of whether it had been obtained in the first instance by acid or alkaline extraction either in aqueous or alcoholic medium, providing in the latter instance the alcohol concentration had not exceeded 80 per cent. Heating any of these protein fractions in a boiling-water bath in alkaline solution for only a few minutes invariably caused practically complete loss of the ketogenic property. We found, however, that heating these same protein fractions for one

hour in acid media (N/10 HCl) resulted in very little loss in ketogenic activity. This observation was repeatedly confirmed and led us to carry out the experiments which are now reported and in which it is shown that the major part of the ketogenic substance present in a primary aqueous alkaline extract of fresh glands is thermostable over a wide pH range which is confined to the acid side.

In the preliminary experiments leading up to the present work the ketogenic activity of extracts was determined by the use of fasted rats. Later it was found that mice of the pure strain (dba), which we have in abundance, are satisfactory test animals. Mice five weeks old were used. They were kept in small, specially constructed metabolism cages of a modified Hopkins type (4 in each cage); urine was collected separately from the faeces and preserved in copper sulphate solution. Total acetone bodies were determined by the gravimetric method of Van Slyke.⁵ Liver neutral fat was estimated as the fraction soluble in both hot alcohol-ether and cold chloroform. Fatty acids were determined on an aliquot of the neutral fat fraction by the saponification procedure and expressed in terms of palmitic acid. As a standard procedure the mice were fasted for the duration of the experiment (46 hours). Injections were made subcutaneously. The total dosage in each instance is indicated in the table in terms of gram equivalents of original tissue. This was injected in 4 equal fractions at 2, 6, 21 and 30 hours respectively after the beginning of the fast. The amount of extract injected at any one time was as a rule 0.25 or 0.5 c.c. The pituitary preparations used were prepared as shown in Fig. 1, and the results obtained are summarized in Table I.

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The findings bring out some striking and rather unexpected results. As will be seen, most of the ketogenic activity appears to be associated with the protein fractions (fractions C and D). The instability of the ketogenic substance to heat in an alkaline medium is amply illustrated with fraction C₁. However, heat-treatment in an acid medium did not appear to cause any appreciable loss in potency (fractions C₃, B₂ and D₂). Even such drastic treatment as heating for one hour in a boiling-water bath in a N/10 HCl medium did not destroy the ketogenic activity (fractions B and D). On the other hand, fraction F was stable to heat-treatment in an alkaline medium. Previous experience⁶ has shown that this latter

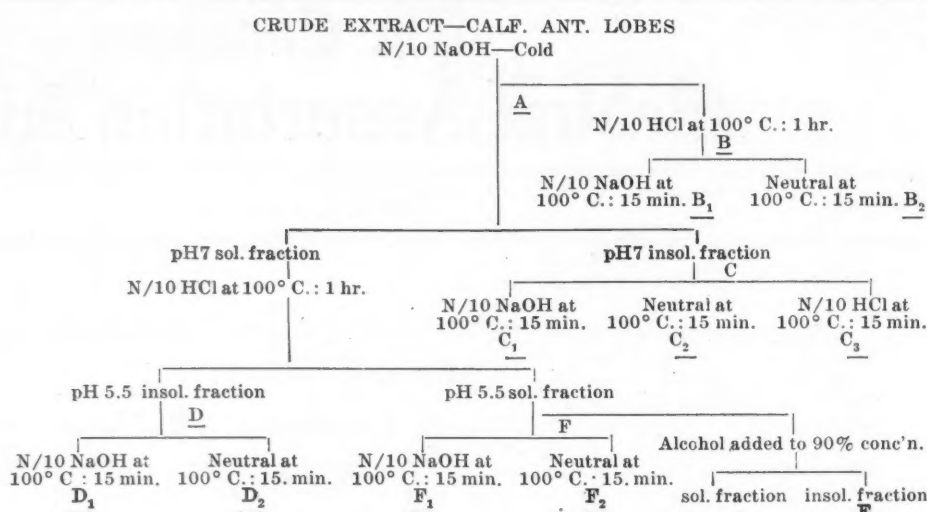


Fig. 1.—Method of fractionation of a primary N/10 NaOH extract of anterior pituitary gland tissue (100° C. = immersed in boiling water in pyrex boiling-tube for time indicated).

would contain the substance responsible for the immediate rise in oxygen consumption associated with a fall in the respiratory quotient, and this has been substantiated by actual observation (1 g. equivalent produced an 18 per cent rise in oxygen consumption in a 2 kilo. rabbit).

The effect of these pituitary preparations on liver fat fully support the findings of Best and Campbell⁷ who pointed out that wide discrepancies may exist in magnitude of the ketonuria and the accumulation of liver fat under the influence of pituitary extracts.

Points of special interest arising out of these experiments are: (1) the thermostable nature of the ketogenic substance in an aqueous acid medium; (2) the presence of the ketogenic substance in isofiltrates obtained after heating active protein fractions in an acid medium; (3) the fact that ketogenic activity can be obtained in the precipitate thrown down with alcohol from such isofiltrates.

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TABLE I.

THE EFFECT OF PITUITARY PREPARATIONS ON THE LIVER FAT AND KETONURIA IN MICE
(4 mice in each test).

			Acetone bodies excre- tion mg. acetone: 100 g. mouse	Liver neutral fat g.: 100 g. mouse	Liver fatty acid g.: 100 g. mouse
Equivalent original tissue g.	Sex				
Control:					
Saline 1.0 c.c.	F.		2.17	0.51	0.14
Saline 2.0 c.c.	F.		1.55	0.48	0.14
Muscle=C	0.2	M.	2.00	0.51	0.13
Muscle	0.4	M.	2.36	0.53	0.13
A	0.2	F.	26.2	0.79	0.18
A	0.4	F.	47.7	0.99	0.20
B	0.4	F.	59.6	0.78	0.18
B ₁	0.4	F.	7.72	0.54	0.16
B ₂	0.4	F.	54.2	0.91	0.21
C	0.2	F.	29.0	1.29	0.32
C	0.4	F.	26.6	0.85	0.20
C ₁	0.2	F.	1.40	0.40	0.13
C ₁	0.4	M.	1.95	0.50	0.13
C ₂	0.2	F.	25.3	0.81	0.17
C ₃	0.2	F.	39.0	0.71	0.16
D	0.2	M.	7.58	0.62	0.17
D	0.4	M.	30.6	0.60	0.17
D ₁	0.2	M.	3.16	0.49	0.13
D ₁	0.4	F.	5.63	0.58	0.15
D ₂	0.2	M.	11.0	0.58	0.19
D ₂	0.4	F.	35.2	0.67	0.19
E	0.2	F.	7.90	0.65	0.16
E	0.4	F.	12.5	0.57	0.15
F	0.2	M.	7.01	0.57	0.16
F	0.4	F.	15.6	0.50	0.14
F ₁	0.2	M.	4.99	0.58	0.18
F ₁	0.4	M.	12.2	0.78	0.20
F ₂	0.2	M.	7.85	0.55	0.17
F ₂	0.4	M.	13.0	0.51	0.12

THE ANTAGONIST TO ADRENALIN HYPERGLYCÆMIA IN PITUITARY EXTRACTS*

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IN a recent communication¹ the association of a number of physiological properties in pituitary preparations, such as an immediate metabolic response, a glycotrophic² and a glyco-static³ effect, and an antagonism to both insulin hypoglycæmia and adrenalin hyperglycæmia was described. Young,⁴ has confirmed certain points in this report. Since other investigators^{5, 6, 7, 8} have shown that adrenalin hyperglycæmia may be reduced considerably by the injection of posterior pituitary extracts, it became evident that a further study of the adrenalin antagonistic effect of pituitary extracts was desirable. In this communication the antagonism of the hyperglycæmic response to adrenalin in rabbits of various pituitary extracts is described.

The antagonism to adrenalin hyperglycæmia was tested in fed rabbits weighing from 2 to 3 kilograms. One-half an hour after the subcutaneous injection of the preparation, 0.1 mg. of adrenalin per kilogram of body weight was administered in the same manner. Blood sugar determinations, using Somogyi's modification⁹ of the Shaffer-Hartman method, were carried out every half hour during a six-hour period. The normal hyperglycæmic response to adrenalin was carried out in the same manner, saline or muscle extracts being used as control preparations. The method used to determine the effect of preparations on the oxygen consumption and the respiratory quotient in rabbits was that previously described by O'Donovan and Collip¹⁰. The ketogenic potency was established by the use of dba mice as previously reported.¹¹

The pituitary preparations used were prepared as shown in Chart 1. Alcohol present in any extract was removed *in vacuo* before injection. The results obtained are summarized in Table I. Extracts A-A.P., F₁-A.P., and F₂-A.P. were prepared from carefully dissected anterior lobes.

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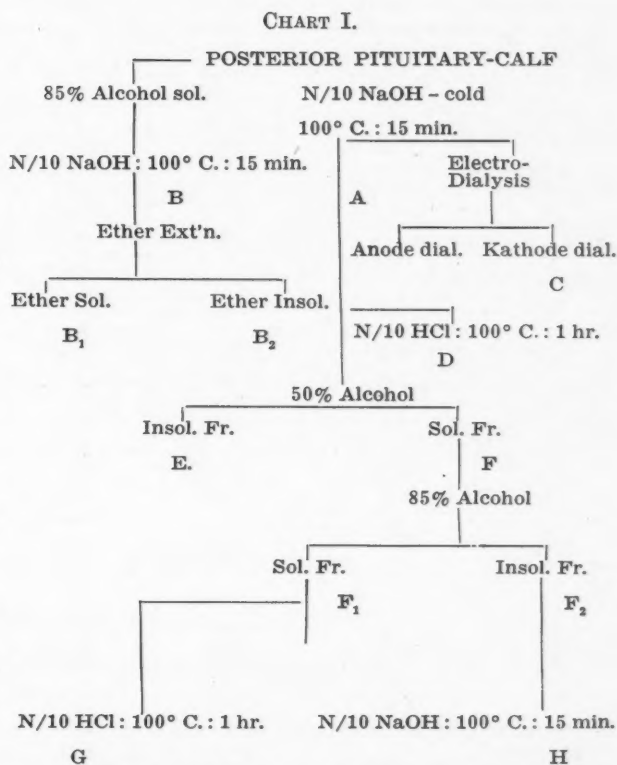


Chart 1.—Method of fractionation of posterior pituitary gland tissue. (100° C. = immersed in boiling-water in pyrex boiling-tube for time indicated.)

Demonstration of ketogenic activity in fraction A was rather unexpected, since the preparation had been heated in an alkaline medium.¹¹ However, the second heat-treatment in an alkaline medium (fraction H) removed this effect. These observations suggest the presence of definite amounts of ketogenic material in posterior lobe preparations. This cannot be accurately measured, however, due to the toxic nature of such preparations.

The results reported definitely point to the posterior lobe as the source of origin of the substance which has the property of antagonizing adrenalin hyperglycæmia. The factor responsible for this antagonism is stable to short heat-treatment in an alkaline medium (fractions A, B₁ and B₂). However, prolonged heating in an acid medium removes most, if not all, of the antagonistic factor (fractions D and G). On the other hand, the metabolic-stimulating

TABLE I.
THE EFFECT OF PITUITARY PREPARATIONS ON KETONURIA, ANTAGONISM TO ADRENALIN HYPERGLYCAEMIA
AND UPON METABOLIC RATE

Preparation	Ketonuria in dba mice		Antagonist to adrenalin hyperglycaemia in rabbits		Metabolic response in rabbits 2-4 hours following injection		
	Injection in 46 hours g.-original tissue	Acetone bodies mg. acetone, 100 g. mouse 46 hours	Injection ½ hour before test: g.- original tissue	Increase of blood sugar as percentage of normal response	Injection g.-original tissue	Percentage increase in O ₂ consumption 2-4 hours following injection	Respiratory quotient change
A	0.04	4.08	0.5	25	0.5	24.6	0.99 - 0.82
	0.1	9.65	0.6	5			
	0.2	14.1	0.6	30			
B	0.1	3.89	0.6	35			
	0.2	4.60	0.8	25	0.5	33.6	0.92 - 0.77
B ₁			0.8	115	0.5	2.9	0.93 - 0.90
			0.7	110			
B ₂			0.6	60	0.5	26.4	0.84 - 0.76
			0.8	45			
C			0.6	40	0.25	9.1	0.80 - 0.81
			0.7	35			
D	0.1	9.4	0.6	105	0.5	26.1	0.92 - 0.79
			0.7	110			
E	0.1	5.92	0.8	80			
	0.2	14.4	0.6	60			
F	0.04	5.84	0.6	55	0.5	17.0	0.85 - 0.81
	0.1	5.83	0.8	85			
			0.8	75			
F ₁	0.04	2.35	0.6	45	0.3	25.2	0.89 - 0.77
	0.1	7.75	0.8	25	0.5	31.0	0.93 - 0.82
			1.0	20			
F ₂	0.1	6.55	0.6	60	0.5	20.0	0.80 - 0.75
	0.2	13.3	0.7	105			
			0.7	65			
			1.0	100			
G	0.1	5.10	0.6	70	0.5	21.2	0.91 - 0.81
H	0.04	2.30	0.8	75			
	0.1	2.22					
	0.2	2.80					
A-trypsin			0.6	40			
A-pepsin			0.6	20			
A-A.P.	0.1	1.76	0.6	105	0.5	9.3	0.82 - 0.79
	0.2	1.54	0.8	95			
F ₁ -A.P.	0.1	0.35	0.7	110	0.5	11.1	0.90 - 0.82
	0.2	0.41	0.8	115			
F ₂ -A.P.	0.1	0.93					
	0.2	1.80					

factor is stable to both alkali and acid heat-treatment (fractions D and G). These properties establish the separate identity of substances responsible for these two effects. Curiously enough, the stability to heat in acid and alkaline aqueous media of the adrenalin antagonistic factor is the reverse of that shown by the ketogenic factor in anterior lobe extracts.¹¹ It should be noted that, per unit weight of original tissue, the posterior lobe preparations show a greater metabolic response than similar ones prepared from anterior lobes (fractions A, F₁, A-A.P. and F₁-A.P.).

The antagonistic factor to adrenalin hyperglycaemia and the metabolic stimulant are soluble in fairly high concentration of alcohol (fraction B and F₁). However, both factors are insoluble in ether (fraction B₁). Both factors are dialyzable on electro-dialysis and pass

to the kathode cell (fraction C), in agreement with our previous findings.¹

Preliminary experiments suggest that the antagonist to adrenalin hyperglycaemia is stable to both pepsin and trypsin digestion (36 hours digestion at 37° C., pepsin in a pH 3 HCl medium, and trypsin in a pH 8.5 medium). These properties suggest that the factor responsible for the antagonism may be distinct from the two well-known posterior lobe principles, oxytocin and vasopressin.^{12, 13} In four rabbits the international standard of oxytocin in doses of 6, 10, 14 and 20 I.U. respectively showed no antagonism to adrenalin hyperglycaemia. Such results would seem to justify the conclusion that the small amounts of oxytocic substance present in some of the extracts were without significance in so far as the anti-adrenalin effects are concerned.

The mechanism of the antagonistic action to adrenalin hyperglycemia is still uncertain. Blotner and Fitz¹⁴ suggested that this perhaps is due to insulin liberation. LaBarre¹⁵ concluded, from cross-circulation experiments in dogs, that posterior lobe extracts cause a liberation of insulin by stimulating the pancreas directly. In this case, our preparations showing antagonism to adrenalin hyperglycemia should by themselves produce a lowering of blood sugar. However, preparations A and F₁ showed no effect on the blood sugar of fed rabbits.

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SOME REMARKS ON LIGAMENTS*

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THE war of 1914-18 presented a challenge to anatomy, a challenge which at some points it failed to meet. At that time Dr. (now Sir) Arthur Keith gave a series of lectures which were published under the title "Menders of the Maimed".⁶ He showed therein that, to meet the challenge of the war with its numberless orthopaedic cases, anatomy must return to the methods of John Hunter, the eighteenth century anatomist, who was also a war surgeon, and, fundamentally, a biologist.

It is now twenty years since Keith gave his lectures, and last year (1937) I had the privilege of inspecting anatomy examination papers from almost all the medical schools in Great Britain and in many parts of the Empire. These papers suggested that we anatomists have not yet fully learned the lessons of the war, lessons that are equally important in times of peace. What the examiners ask for in such papers the textbooks will supply; but the textbooks are also the sources to which surgeons

and other clinicians turn for information, and they naturally ask for something more than muscle attachments, nerve supply and regional anatomy, that is, static anatomy. They want information, for example, on the actions of muscles and ligaments in the living body—dynamic anatomy. On these things the textbooks are often uninformative, misleading and unscientific.

This is a sweeping criticism, and destructive criticism is easy, and sometimes in bad taste. It is not, however, a personal criticism. It is a statement of fact, which many anatomists are now coming to realize. All of us gross anatomists are still suffering from the curse of the nineteenth century, the time when anatomy became so large that part of it was separated from the rest and became physiology. Many of us were brought up to believe that experiments had little to do with anatomy, and now that we are returning to the experimental method of John Hunter we are finding many traditional statements that are open to doubt and many gaps in our knowledge. It is surely desirable that clinicians who use the textbooks

* Read at the Sixty-ninth Annual Meeting of the Canadian Medical Association, Section of Surgery, Halifax, June 23, 1938.

should know that many of the dogmatic statements therein are open to question.

MUSCLES AND LIGAMENTS IN THE MAINTENANCE OF POSTURE

As an instance of questionable statements one can take the relationship of muscles and ligaments in the maintenance of the upright posture. Keith in his "Menders of the Maimed" pointed out that Hunter was well aware that ligaments (fibrous tissue structures) were not used to support *continued* strain, because they would inevitably stretch. Keith said: "Place your fingers on the neck of the browsing ox or in front of the hip of the standing man, and you will find the muscles are in a state of contraction; they are saving the ligaments from strain." That is, they are saving even the strongest ligament in the body, the ilio-femoral (Y-shaped) ligament of the hip joint. In contrast with this is the statement made in the latest edition of a widely used manual of anatomy, nearly twenty years after Keith spoke, and nearly one hundred and fifty years after the death of John Hunter. In the upright position, the manual says, the ilio-femoral ligament is tense, to save the muscles. Surely if the writers had tried to make their own ilio-femoral ligaments tense they would have felt how unnatural and uncomfortable their posture was.

The same kind of statement applies to the knee joint, and all such phenomena are, of course, in accordance with the work of Sherrington and others on the maintenance of posture by muscles.

In the foot there is so much disagreement regarding arches and foot disorders that the anatomist is tempted to leave the matter to the clinician. And yet it is the anatomist's function to describe normal structure. In other parts of the body the cadaver often misleads him, and he must turn to living subjects; but in the foot even the living subject, if he wears shoes, is apt to mislead. Anatomists try to find what specialists in foot disorder consider to be the normal foot, and in so doing sometimes meet completely contradictory statements. One of the most striking instances is found in regard to the metatarsal and cuneiform of the great toe. One experienced orthopaedic surgeon⁸ says that normally the joint between the metatarsal and cuneiform is very mobile. If it

has limited mobility he relieves foot trouble by manipulating the bones to make the joint mobile. Another orthopaedist who has become an anatomist⁹ says that hypermobility of this segment of the foot is responsible for a wide range of foot trouble.

As regards the arches of the foot, it has been known for a long time that a foot in which the whole sole touches the ground is not necessarily pathological. This was well demonstrated in a survey of 850 persons made by Hoffman at the St. Louis World's Fair in 1904.⁵ Dr. Bankart,¹ the London orthopaedic surgeon, goes farther than that, for he emphatically states that "the natural foot should be so supple that it can be completely flattened or raised into the form of an arch at will."

Dr. R. D. Lockhart, Professor of Anatomy at the University of Birmingham, England, has kindly supplied some radiographic evidence on this point, photographs and radiographs of the foot of a man forty-one years old, with a history of complete absence of foot trouble and leading a comparatively active life.* His weight was about 150 pounds, and height 5 feet 8 inches. The first picture shows a well marked arch during voluntary contraction of the muscles of leg and foot; while the second picture shows the flattening when the muscles were relaxed. The difference in the heights of the arch in the two conditions is well shown in the third picture, in which the tracings of the two radiographs are superimposed. One can conclude from these pictures: (1) that there was in this foot, that showed no symptoms of disease, considerable mobility of the bones; (2) that great apparent flattening of the foot, as seen externally, does not indicate a corresponding degree of flattening of the bony arch. This is the kind of observation that should be carried out on a much wider scale.

There is still opposition between those who believe that the arches of the foot are maintained by ligaments and those who say that the muscles are the primary factors. In view of what is known about muscles maintaining posture in other parts of the body, it is obvious

* These pictures are to be found in the section on Myology, revised by Professor Lockhart in the latest edition of Cunningham's "Textbook of Anatomy". The age and other details were kindly supplied in a personal communication by Professor Lockhart. (Since this paper was read Dr. Lockhart has become Professor of Anatomy at the University of Aberdeen.)

that a very strong case indeed would have to be made in favour of ligaments and joint capsules in the foot before they could be accepted as of primary importance. In one recent book the author tries to show that muscle weakness is relatively unimportant as a cause of arch trouble. He tries to do so by measuring the power of voluntary contraction of the muscles; but such a method is open to serious criticism. First, it is by no means unlikely that two different kinds of muscle cells are at work, even in human muscles, one kind mostly in postural contraction, the other mostly during voluntary contraction. Secondly, postural tone depends on impulses conveyed for that purpose through the central nervous system, and the power of muscles, contracting voluntarily, can hardly be a measure of the nerve impulses that pass to and from the muscles when they are being used for maintenance of posture. The lesson from this is that no one can adequately study the arches of the foot without knowledge of the modern physiology of posture. Anatomy, physiology and orthopaedic surgery cannot be separated without danger to them all.

LIGAMENTS DURING VOLUNTARY MOVEMENT

If one turns to the use of ligaments during voluntary movements of joints, one finds that many textbooks still state or imply that ligaments mechanically stop these movements, that is, prevent over-extension, over-flexion, and so on. And yet surgeons and some anatomists have repeatedly pointed out that muscles are the first line of defence. When they are stretched by the movement of a joint they initiate a reflex, which increases their tone. Even when tension is brought to bear on the ligaments themselves, they apparently do not at first act as simple mechanical restraints.¹¹ When they are stretched, they, like the muscles, send to the spinal cord nerve impulses which presumably again reflexly increase the tone of the muscles. It is probably only as a last resort that the ligaments act mechanically.

DIFFICULTIES IN SOLVING ANATOMICAL PROBLEMS

Finally, three examples may be mentioned to illustrate the kinds of difficulties that are met in attempts to solve apparently simple problems.

First, experiments on joint movements in the cadaver are full of pitfalls. Regarding the

cruciate ligaments of the knee, the common textbook statement still is that the anterior cruciate ligament is tense in extension, the posterior in flexion. About a quarter of a century ago, however, a careful observer⁴ decided that both cruciate ligaments were tense in full extension, and both were tense in full flexion, while both were slack in semi-flexion. An experienced German anatomist³ states that one border of each cruciate ligament is tense in extension, while the opposite border is slack. A similar condition, he states, exists in flexion, but the borders that were tense in extension are now slack, and vice versa. It hardly appears, therefore, that a dogmatic statement is permissible, even in a textbook, without some evidence being presented in its favour.

The second example shows that one must continually remember that the cadaver is usually that of an old, diseased, undernourished and enfeebled person. When he examines in the cadaver the so-called "ligaments" of the pelvis the anatomist finds at the side of the vagina, above the levator ani muscle, some fat and rather weak fibrous tissue. Bonney,² the gynaecological surgeon, says that in that position in the living subject lies the cardinal ligament, a very strong fibro-muscular mass. Such apparent contradictions can only be understood when allowance is made for the type of subject that forms the dissecting room population. Incidentally, if Bonney is correct in stating that the cardinal ligament is the main support of the upper two-thirds of the vagina, this is not out of harmony with Keith's statement that ligaments are not used for continued strain. The fibrous tissue masses and so-called "ligaments" of the pelvis are really fibro-muscular structures containing unstriated muscle.

The third example shows that one must beware of anatomical pictures. A well known picture shows two fascial bands deep to the ramus of the mandible—the sphenomandibular and stylo-mandibular ligaments. They appear much stronger in the picture than in actual dissections, and certain workers have concluded, apparently from this picture, that these ligaments control the angle of the mandible when one opens one's mouth. Surely if these writers had critically examined the ligaments in actual specimens and felt the force that could be exerted by their own muscles in opening the mouth against resistance, they would hardly

have made that deduction. One must not over-emphasize the anatomy of the living body to the exclusion of careful examination of dissected specimens.

METHODS BY WHICH CLINICIANS CAN ASSIST ANATOMISTS

Clinicians have helped anatomists many times in the past to throw light on normal structure and function. (Occasionally clinical observation has misled anatomists. It is stated, for example, that the current conception of the femoral sheath arose in that way;¹⁰ but that was not the fault of the clinical observers.) Clinicians can give help even by asking questions, and, especially if a dogmatic answer is given, by demanding to see the evidence on which it is based.

A specific suggestion may be made regarding a method by which anatomy in Canada could be helped by those who have influence in the Royal College of Physicians and Surgeons. It might be suggested that in one small part of the Primary Fellowship examination a candidate should be required to criticize some evidence, to use his judgment, and to show whether he knew where to look for information, instead of simply re-

producing facts, or so-called facts. Possibly in this way Canada could have something that would be more scientific, and therefore of greater ultimate clinical value than the English Primary Fellowship examination.

Perhaps these remarks have given no positive information—simply doubt and uncertainty; but that is, I think, at our present stage, the first step towards true knowledge.

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THE EFFECT OF CERVICAL SECRETIONS ON THE VITALITY OF SPERMATOZOA

BY MELVILLE C. WATSON, M.B. (TOR.)

Toronto

ONE of the many factors which contribute to sterile marriages is the detrimental effect of vaginal and cervical fluids on the invading spermatozoa. Fertilization is strongly favoured when a number of healthy spermatozoa are transferred from the seminal fluid into a fresh alkaline secretion from the cervical glands. During the examination of repeated post-coital samples of cervical secretion for the purpose of determining the number of actively motile spermatozoa present the author has been impressed with findings which are not uncommon, namely, deficient cervical secretion, tenacious mucous plugs in the cervix, and the presence of a mild inflammation, as indicated by a few pus cells in the specimen. Any one or any combination of these conditions is definitely hostile to the invasion of healthy spermatozoa.

It is known that oestrogenic substances when

administered to the human female will stimulate active secretion in most of the glands in the reproductive tract. It appeared to be reasonable, therefore, that any sudden stimulation of the cervical glands by œstrin, coinciding with the additional stimulus from copulation, would result in a free flow of fresh secretion from these glands which would tend to remedy these abnormal conditions which are a detriment to the passage of the male cells through the cervical canal.

A small series of patients, in which one or more of the above conditions were the only demonstrable abnormalities, showed very few actively motile sperms at three successive post-coital examinations that were done at forty-eight hour intervals during the estimated fertile period. Each patient was given 100,000 to 150,000 international units of œstradiol ben-

zoate intramuscularly, approximately forty-eight hours previous to the fourth examination for the presence of motile spermatozoa in the cervical mucus. The increase in the quantity of secretion available for examination in all these cases, together with the change to normal viscosity and transparency, was no less remarkable than the very marked increase in the count of the number of actively motile sperms which could be recovered even at a distance from the cervix in the vaginal fluid up to four hours after coitus.

Stimulation by oestrogens* is a useful form of treatment in sterile patients when deficient cervical secretion, a tenacious mucous plug in the cervix, or a mild non-specific vaginitis, exist either singly or in combination. The cure of these conditions is offered as a possible explanation of the tendency of patients to conceive more readily after the administration of oestrogenic substances such as oestriol glucuronide over a longer period of time.

* Estradiol benzoate—Estroform "B", British Drug Houses, Progynon "B", Schering. Oestriol glucuronide—Emmenin, Ayerst, McKenna and Harrison.

SULPHANILAMIDE IN THE TREATMENT OF BACTERIAL ENDOCARDITIS*

By L. J. SOLWAY, B.A., M.B., M.R.C.P., F.R.C.P.(C.) AND H. G. PRITZKER, B.A., M.D.

Toronto

THE specific action of sulphanilamide in infections caused by hæmolytic streptococci is now generally recognized. It is also conceded that this drug has no effect on infections due to *S. viridans*. As yet there are few reports on record of its use in bacterial endocarditis, either acute or subacute. Hussey¹ reports an apparent cure in a case of bacterial endocarditis with blood cultures positive for *S. hæmolyticus*. In a case which yielded positive cultures for *S. viridans*, Major and Leger² describe histological evidence of healing following sulphanilamide therapy. To quote one author,³ "The reason they continue to live in the vegetations of the heart valves is probably due to the fact that the bacteria are situated in an area where there are few leucocytes or tissue phagocytes, and the bactericidal action cannot operate effectively." In the case to be presented, following large doses of sulphanilamide, the patient survived for seven months, and then came to autopsy exhibiting many points of interest, and is, therefore, deemed worthy of record.

J.R., aged 53, was admitted, May 24, 1938, to the Mount Sinai Hospital, complaining of progressive weakness for some weeks. The family history was irrelevant. In 1915 he had had rheumatic fever with cardiac involvement, and later showed signs of mitral stenosis. In 1925 he was in a hospital with hæmatemesis and peptic ulcer. In 1928 he had had pleurisy. Since then he had been steady at his work, with little disability, and up to a few weeks before admission he had felt as well as ever.

The onset of his present illness was insidious. In April, 1938, he attended an out-patient clinic at another

hospital, where a rise of temperature was first noted. He had his first chill on May 10th, with subsequent recurrences. By the time of admission he had lost 24 pounds in weight.

The essential features in his physical examination were: The heart was enlarged to percussion. In the mitral area there were presystolic and systolic murmurs but no thrill was felt. Over the sternum between the 2nd and 4th interspaces a sharp rough murmur was heard, diastolic in time, variable in intensity at different later examinations, but at the time very pronounced. There was in addition a short snappy rumble, heard only on sitting up, and of maximum intensity about the lower sternum and immediately to the left. The second pulmonic sound was accentuated. The liver was just palpable, and tender. The spleen was not palpable. There was marked clubbing of the fingers, less so of the toes. There were no petechiæ or Osler nodes. The neurological examination was entirely negative.

Laboratory examinations: urinalysis at first showed a few blood cells, but these disappeared on repeated later examinations. Blood: white blood cells 11,700; red blood cells 4,860,000; hgb. 91 per cent (Sahli); neutrophils 75 per cent, lymphocytes 20 per cent, monocytes 5 per cent. The sedimentation rate was 33 mm. in 1 hour. The blood Wassermann (Kolmer) and Kahn tests were negative. A blood culture taken May 25th was negative, but one taken May 31st showed the presence of *S. hæmolyticus*. Agglutination tests were negative for typhoid, paratyphoid and *Br. abortus*. X-ray examination of the chest (May 26th) showed enlargement of the heart, mitral configuration; the lungs were clear. The electrocardiogram showed right ventricular preponderance, but no increase in the P-R interval or change in the Q-R-S complex.

On the third day after admission the chills recurred and continued nightly, with the temperature rising to 104°. The patient now presented a more toxic appearance, and the hæmoglobin dropped to 63 per cent. On June 2nd, at 7 a.m. he complained of sudden pain in the left leg. There was no pulsation in the superficial arteries, and the leg became cold up to about three inches above the knee, and definitely paler. Gradually, however, with general improvement the leg also improved.

Sulphanilamide was begun on May 28th, on a trial basis. When the blood culture was returned positive for *S. hæmolyticus*, the dose was increased, and in addition to oral administration he was given daily 500 c.c. of 0.8 per cent sulphanilamide solution in saline subcutaneously for a period of five days. The drug was

* From the Medical Service and Department of Pathology, Mount Sinai Hospital, Toronto.

continued orally only for another five days, and then discontinued temporarily up to June 17th, when he again received 50 grains daily for nine days. From July 2nd to the 16th the drug was again resumed orally in doses of 90 grains daily. The blood concentration of sulphanilamide was maintained at 12 mg. per 100 c.c. for some days. Aside from symptomatic relief nothing else was done in the way of treatment.

After five days on sulphanilamide there was marked subjective improvement. The chills stopped and the temperature only occasionally rose above 100° F. The diastolic murmur heard at the level of the 3rd interspace entirely disappeared, while the systolic rumble heard lower down, so loud before, slowly diminished in extent and intensity, and finally disappeared. Repeated teleroentgenograms showed no change in the size of the heart. Repeated blood cultures remained sterile.

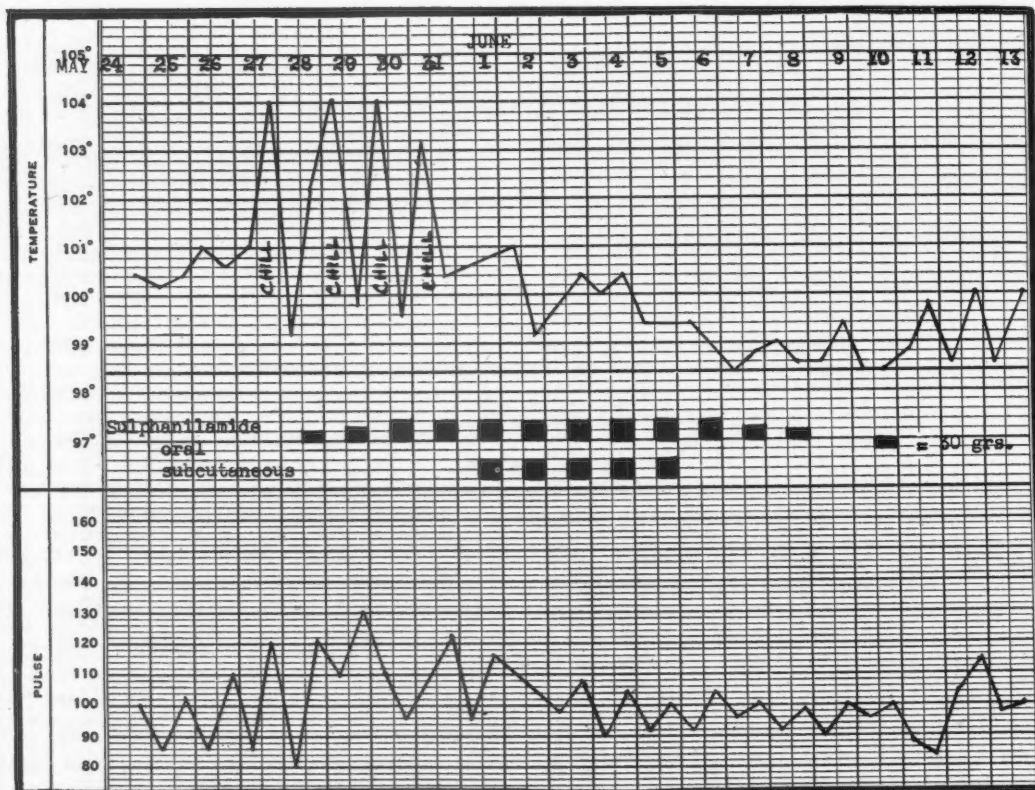
In all he received three courses of sulphanilamide orally, with subcutaneous administration added only in the first course. The total amount was very large, yet at no time did he show any ill effects from the drug, except some cyanosis, which rapidly disappeared on its discontinuance.

and his emaciation similarly progressed in spite of a high caloric diet. On the whole the patient presented the features characteristic of the bacteria-free stage as described by Libman⁴ for subacute endocarditis.

On November 6th the patient left the hospital. While at home he showed no further improvement and, in spite of subjective well-being, his anaemia and emaciation progressed. On December 19th he was seized with sudden severe cramps, passed tarry stools, and had an extensive crop of petechiae. He was re-admitted to the hospital with marked respiratory distress, and died shortly afterwards.

Autopsy.—This was performed two-and-a-half hours after exitus. The body showed marked emaciation, pallor and dependant oedema. Widely scattered over the trunk and limbs as well as in the conjunctivae, were numerous petechiae, which were also seen about the caecum and on the peritoneum. The liver was large, firm and showed nutmeg markings. The spleen was enlarged, boggy and showed healed and recent infarcts. Similar infarcts were present in the left kidney. The pleural cavities contained fluid, while the lungs were firmer than usual and showed marked congestion and

CHART



B.i.d. temperature chart. First course of sulphanilamide taken.

The patient's further progress showed little change for many months. His temperature course ran close to but slightly above the normal line, while the pulse rate was also increased. Subjectively, he was much improved. There were no further chills. There were no obvious changes about the heart. The diastolic murmur, when heard at all, varied considerably in intensity, but most of the time was not heard. The spleen became palpable about the fourth week and very gradually enlarged. The urine at no time showed any evidence of renal involvement, nor were there any further embolic phenomena until the terminal attack. Later he developed congestive heart failure with dependent oedema and râles at the lung bases. The anaemia persisted in spite of treatment,

small hæmorrhages. The pericardial sac contained 100 c.c. of clear, straw-coloured fluid. The heart weighed 523 grams. A small amount of epicardial fat was present. The pulmonary valve was grossly normal in all respects. On one of the leaflets of the tricuspid valve there were two discrete vegetations, the largest measuring 0.4 cm. in diameter. These were pearly-white in colour and fixed to the leaflet quite firmly. There were marked changes of the aortic valve. Large friable adhesions were present in each cusp and extended down into the ventricular wall proper. Portions of these were very firm, pearly-white in colour and densely adherent to the cusps. The more superficial portions were greyish-brown in colour and friable. The free borders of the

cusps were thickened, as were the cusps themselves. The commissures showed no gross abnormalities. Near them, however, two of the cusps showed some fenestration. The cusp opposite the right coronary artery was markedly ulcerated right down to its base. The opening for this coronary artery was markedly narrow. The aortic side of the mitral leaflet contained a large vegetation near the adjacent aortic cusp. The free border of this mitral leaflet also had numerous fine bead-like vegetations on it. These extended down to the chordae tendineae and to the papillary muscles. The latter were quite thick and the former shortened. The mitral leaflets were thick and concave where they are usually convex. Vegetations similar to some of those seen on the aortic cusps were present on their inner surfaces. The largest of these measured 2.5 x 1.5 cm. (Fig. 1). The coronary

the valves. In nearly every section colonies of bacteria are present about the periphery of the valves and their thrombi.

SUMMARY

A patient with rheumatic heart disease insidiously developed fever and chills, and after about six weeks his condition became quite grave. A blood culture taken at that time was positive for *S. hæmolyticus*, the validity of which finding there is no reason to doubt. In the absence of any other obvious source of infection



Fig. 1

Fig. 1.—The heart on section. Aortic valve: note thickness of cusps: ulceration and vegetations on these cusps and on mitral leaflet. Fig. 2.—Right ventricle. High power (x600) showing foci of inflammatory cells in the myocardium.



Fig. 2

arteries were patent throughout. In a few regions there was some fatty infiltration of their intima.

Microscopically.—Sections of the heart muscle show foci of chronic inflammatory cells and leukocytes to be present in the right ventricular wall (Fig. 2). In one case, however, these cells have been augmented by histiocytes and a multinucleated giant cell. In the pericardium there has been a marked fibroblastic proliferation and an infiltration by many chronic inflammatory cells. There are thrombi in many of the pericardial vessels, which are undergoing organization. About these the inflammation is most intense. The myocardium of the left ventricle shows large areas where no muscle fibres are present. These consist of fibrous and fibroblastic tissues infiltrated by many chronic inflammatory cells. In other regions, however, many leukocytes are present. The muscle fibres about these areas stain poorly and are somewhat fragmented. Many of the muscle fibres contain droplets of fat.

Many sections of the tricuspid, aortic and mitral valves were made, especially through the vegetations. In some cases there have been deposits of fibroblastic tissues which are rather free from inflammatory cells. In other regions, thrombi are present, which are undergoing organization. In other areas recent thrombi are present, while in still other areas myriads of polymorphonuclear leukocytes mixed with fibrin are adherent to

a diagnosis of acute bacterial endocarditis was warranted. Following sulphanilamide administration there was dramatic improvement, and the patient survived for five more months after the drug was discontinued, running a bacteria-free stage as seen in subacute endocarditis. Before death widespread embolic dissemination took place, which suggests possible recurrent infection.

The pathological evidence showed healing in and about the scarred valves as well as healed areas in the myocardium and healing focal glomerulo-nephritis. On the other hand there was active ulceration of, and the presence of large colonies of bacteria in and about, the valves. The numerous recent infarcts and the inflammatory lesions in the spleen, kidneys and myocardium speak for a continuous process of infection. The involvement of the pericardium and myocardium is more often seen in the

hæmolytic infection than in that caused by *S. viridans*.

In conclusion, if sulphanilamide is to be given any credit for the temporary spectacular improvement in this case, this drug had apparently not affected the vegetations nor altered the ultimate result.

FRACTURES OF THE MORPHOLOGICAL NECK OF THE HUMERUS IN CHILDREN*

By L. J. AUSTIN

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I WISH to present a few cases of fracture involving the morphological neck of the humerus. I have not many to illustrate this paper as I find this a comparatively rare accident. The lesion is usually described as separation of the upper epiphysis of the humerus, and while a true separation may occur it is seldom pure and absolutely across the growing line.

Anatomy.—The upper end of the humerus is developed from three centres—the head, the greater tuberosity, and the lesser tuberosity, appearing at one year, three years, and five years, respectively. These three centres join together at the sixth year and unite to the shaft at from 18 to 20 years. Separation is therefore only observed up to about eighteen to twenty years.

The humerus presents three necks. (1) The anatomical neck, following the edge of the cartilage of the head; this is seldom the seat of fracture and almost always this occurs in the later periods of life. (2) The morphological neck, representing the line of the epiphysis and most actively growing part of the bone. This line shows a central peak in the shaft that fits upwards into the epiphysis and may assist in the restoration of anatomical position after reposition. (3) The surgical neck, about one inch below the epiphyseal line, and the only common site of fracture at this end of the bone.

CASE 1

N.McC., aged 13. On September 26, 1936, this boy was knocked off his wheel by a car and landed on the region of his left shoulder. When seen next day, the lower fragment of the humerus was displaced upwards, forwards and outwards, and lay under the skin at the level of the acromion process. Several attempts to reduce this under an anæsthetic and the screen failed. The

* Read at the Sixty-ninth Annual Meeting of the Canadian Medical Association, Section of Surgery, Halifax, June 22, 1938.

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x-ray showed an oblique fracture across the line of the morphological neck, with part of the shaft attached to the upper fragment running downwards as a spike on the inner side.

After failure to reduce the deformity by manipulation and extension an open operation was performed through the anterior aspect of the deltoid on October 5, 1936. It was found that the line of the fracture was like an oblique step, the outer part following the line of the epiphysis and the inner sharply sloped off. The neck of the humerus was embraced by the deep fibres of the deltoid, making reduction difficult even when exposed. As the slope of the fracture line was oblique the fragments would not stay in position and they were fastened by a single screw.

I have not been able to see this child again but on enquiry in June, 1938, his mother informs me that he has no trouble and "the joint is just as good as ever".

CASE 2

H.H., aged 15. On July 30th this child sustained a fracture of the left humerus in a bicycle accident. On examination there was a step-like fracture of part of the morphological neck and the shaft, with a spike of the shaft adherent to the upper part of the inner side. The lower fragment was displaced outwards and a little upwards, and could be felt under the fibres of the deltoid.

Attempts to reduce under an anæsthetic failed and an operation through the anterior aspect was performed on August 2nd. The lower fragments were found embraced by the deltoid fibres which had to be divided before reduction could be obtained. After the bone was replaced it was found that there was so definite a shelf in a transverse position that the fragments locked and remained in good position when the arm was abducted and fixed in plaster.

June, 1938. Seen two years later, he had perfect movement and good control of the shoulder, and was able to play ball. The scar was somewhat keloid and a little tender.

CASE 3

L.S., aged 14. On September 1, 1937, this boy, while riding a wheel, was hit by a car and severely injured in the head, face and left arm. He was sent up from Brockville with the diagnosis of fracture dislocation of the left shoulder. On examination there was gross deformity with a large bulge under the deltoid process upwards and forwards almost to the clavicular-acromial joint. An x-ray showed a wide overlap of the lower fragment of the humerus and no sign of reduction in an aeroplane extension apparatus.

On September 2, 1937, an open reduction was performed and the lower fragment was found in the substance of the deltoid muscle, which had to be divided to effect reduction. The fracture mainly through the morphological neck showed a spike on the under side, where the shaft bone was attached to the head. This

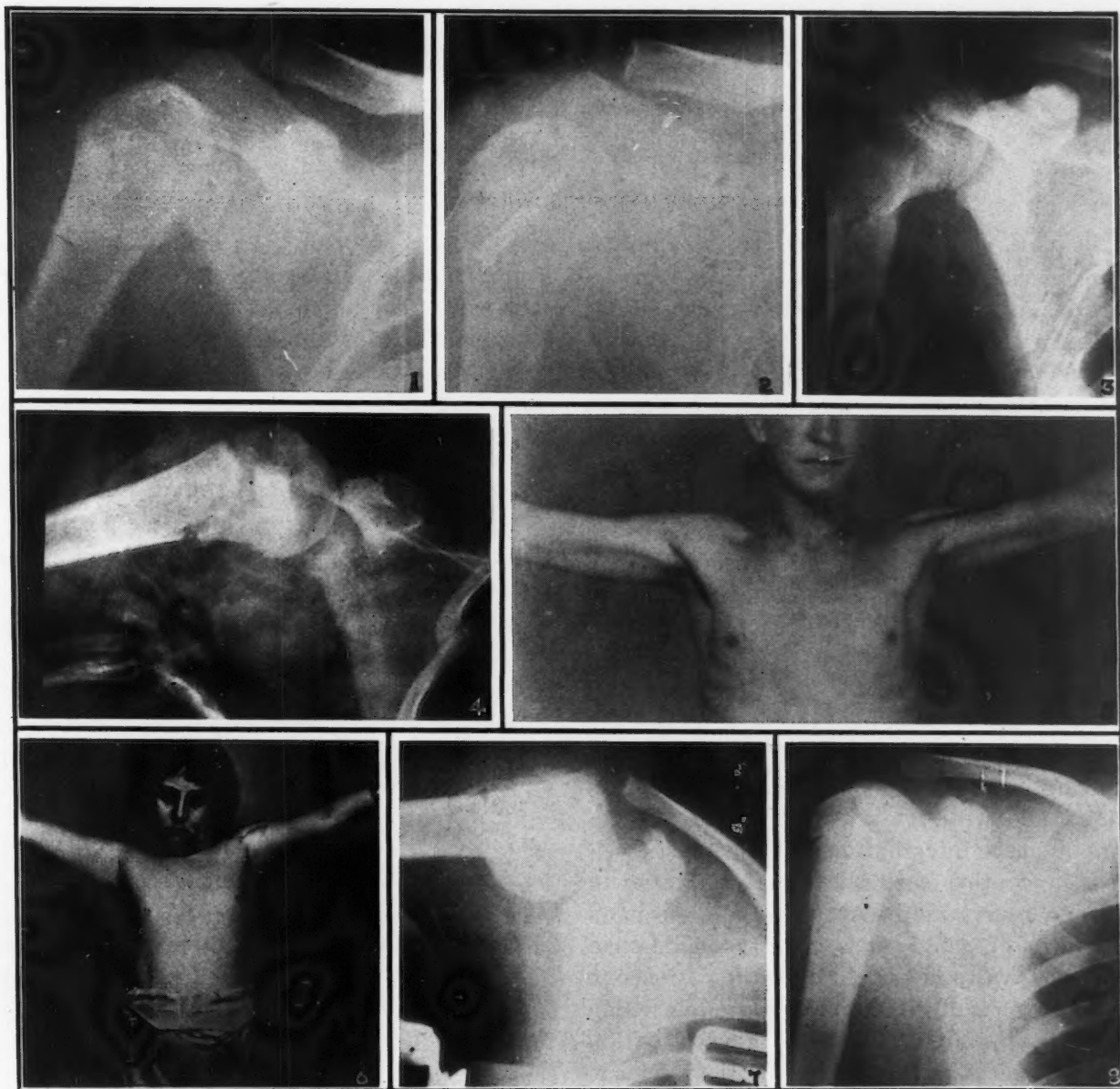


Fig. 1. Case 1.—X-ray before operation. Fig. 2. Case 1.—X-ray after fixation. Fig. 3. Case 2.—X-ray before operation. Fig. 4. Case 2.—X-ray after operation. Fig. 5. Case 2.—Recent photograph. Fig. 6. Case 4.—Recent photograph. Fig. 7. Case 3.—X-ray before operation. Fig. 8. Case 3.—X-ray after operation.

fracture was largely oblique and would not stay in position and a screw was required for apposition.

Seen in June, 1938, with practically perfect results; no shortening; he was able to play.

CASE 4

H.W., aged 10. On October 14, 1937, this patient fell off a horse and landed on her left shoulder. The deformity was very severe, with the upper fragment abducted at 90°, and the lower forwards and upwards entirely in front of the upper and projecting under the anterior deltoid fibres.

Open reduction on October 15th showed a complete transverse separation of the morphological neck, with a small piece of the greater tuberosity entirely separated. The lower fragment was held by the fibres of the deltoid, but when freed from them, slipped easily into position in relation to the upper fragment and remained in position in full abduction.

Seen in June, 1938. Good position and shape of shoulder; full extension over head was not yet established. Abduction good. As the arm rose there was a tendency to bend the neck to the same side.

CONCLUSIONS

1. This fracture is not very common.
2. While the forward displacement of the shaft should in most cases settle the nature of the lesion a correct diagnosis must be obtained by the x-ray.
3. The line of separation is seldom true and accurately transverse, as a part of the inner side of the shaft is usually carried away with the epiphysis.
4. The peritoneal sheath and deep fibres of the deltoid often form a formidable obstacle to reduction.
5. Often reduction and, if necessary, screw fixation is needed in most cases.

CLOSED INTRAPLEURAL PNEUMONOLYSIS*

(REPORT OF 124 CASES)

By C. H. ANDREWS, M.D.

Prince Albert, Sask.

[I]t is now accepted that closed intrapleural pneumonolysis must be an available procedure in any program of collapse treatment of pulmonary tuberculosis. Various authors give figures indicating that 15 to 20 per cent of pneumothorax cases require cutting of pleural adhesions before satisfactory collapse is obtained. Thoracic surgeons, writing on this subject, urge that the operation should not be performed by those outside their guild. On the other hand, there are internists especially interested in tuberculosis who are experts in the field, who have added much to our knowledge, and have made their contribution in technical developments. To us at least it appears that pneumonolysis is a procedure justifiably within the field of physicians specializing in tuberculosis, familiar with pneumothorax and with the selection of patients for phrenic nerve interruptions, thoracoplastic collapse, and other surgical forms of treatment. The one undertaking it should be of a mechanical turn of mind and have good manual dexterity. Also he should have the patience to acquire, especially if using a right-angle vision telescope, the ability to orient himself within a dummy chest and to manipulate the electrode so that the tip automatically can be moved to any desired point. Any institution in which are established 75 or 100 new pneumothoraces a year should furnish sufficient cases to justify one staff member becoming proficient in this art. Like phrenic nerve operations, bronchoscopy, cystoscopy, and other necessary procedures in the treatment of tuberculosis for which outside specialists are usually called in, this aid to pneumothorax will tend to be used to a fuller extent and to better advantage if done within the full-time organization. Each sanatorium adding this feature to its treatment facilities must consider the probable number of cases, availability of an already experienced operator, staff personnel, relative cost, etc., in deciding to whom to entrust this work. What-

ever plan is adopted, the procedure should be available promptly at the optimum time for each case. The loss of time to the patient and economic loss of maintaining an inefficient pneumothorax are obvious. Our experiences in beginning this work, reasons for choice of methods and equipment, and preliminary practice are recorded elsewhere.¹ The results to date with the work being done by a staff physician are reported here. Our work was started in the fall of 1933 and to the end of March, 1938, 124 cases had been completed as shown in Table I. The equipment was used

TABLE I.
CLOSED INTRAPLEURAL PNEUMONOLYSIS

Total accepted for pneumonolysis	131
Cases completed	124
Rejected after thoracoscopy	5
Awaiting second operation	1
Refused second operation	1
Two-stage operations included in above 124	15

once to inspect the lung surface in a case of suspected malignant tumour where a diagnostic pneumothorax had been established, and once to remove a broken aspirating needle.² The same telescope, with an air-tight metal cannula, may also be used for peritoneoscopy.

The relation of the number of pneumonolyses to pneumothoraces established (from the middle of 1933 to the end of 1937) is shown in Table II, together with comparative figures from other reports. We feel that most cases in which the x-ray film shows free adhesions or more extensive pleural symphysis should be investigated with the thoracoscope, a harmless procedure, as cases appearing very unsuitable for this operation have been found to have adhesions that could be cut readily. The reverse situation also occurs. As a routine, we take two oblique films before undertaking thoroscopic examination, as we find these give better localization than the stereoscopic antero-posterior view. Films taken on expiration, with the adhesion stretched to the maximum, are better in this work than those taken on the usual full inspiration.

* From the Prince Albert Sanatorium of the Saskatchewan Anti-Tuberculosis League, Prince Albert, Sask.

TABLE II.
PNEUMOTHORAX AND PNEUMONOLYSIS

	Pneumo- thoraces established	Accepted for pneumo- nolysis		Rejected after thoraco- scopy		Suitable for pneumo- nolysis	
			Per- centage		Per- centage		Per- centage
This series....	621	131	20.1	5	0.8	124	19.1
Stivers ³			25.0		3.0		22.0
Michigan State Sanatorium ⁴	625						14.8*
Anderson and Alexander ⁴ ..		111		24		87	
Deist ⁴	1,171						14.6
Unverricht ⁴ ...							Less than 10%

*Open and closed methods.

The optimum time for operation is given by most writers as from 3 to 6 months after the establishment of pneumothorax. In this series the average elapsed time was 5.1 months (longest 13, shortest 2). This figure was obtained by excluding 7 of the early cases (longest 92, shortest 17 months) which would have been done sooner had the procedure been available.

Single adhesions were found in only 35 cases: fold, 15; band, 8; spool, 6; cord, 4; cone, 1; string, 1; funnel, 0. In the multiple adhesion cases one or more of the following were found; cords 49 times, folds 44, bands 28, strings 27, spools 16, cones 4, funnel 1, arachnoid, 1. Varying degrees of pleural symphysis and large columns of lung adherent to chest wall are not included. Combinations of strings, cords and bands, the easiest and safest to cut, were found in 27 cases.

Other conditions present at time of operation were; clear exudate, a trace, 7; moderate amount, 14; purulent exudate, 3; previous oleothorax, 2; contra-lateral pneumothorax, 3. The sputum contained tubercle bacilli in all but 27 cases; in these the area held uncollapsed by the adhesions previously had cavity or were cases in which the staff considered further collapse of the area was very desirable.

The technique followed was that of Matson⁵ which is a two-puncture method, using surgical diathermy for cutting. As stated in our previous article,¹ our equipment consisted of a Jacobaeas-Unverricht right-angled vision thoracoscope, Matson's trocar and bakelite cannulas, and his jointed and flexible electrodes, Bethune's transilluminator, a laryngeal forceps,

and a Bovie surgical diathermy unit. In 15 cases in which adhesions, usually spools, thick bands, and folds, were found which were thought to be too thick to cut safely as they might contain prolongations of lung or cavity, or large blood vessels, Matson's two-stage technique was followed. A ring of pleura around the costal end of the adhesion was destroyed, allowing the adhesion to stretch out and become thinner so that at a second operation, 2 or 3 months later, it would be readily and more safely severed. The average length of operation was 45 minutes. The longest taking 90 and the shortest 10 minutes.

The sites for the insertion of the cannulas were in the lateral chest wall, one anterior to the edge of the scapula and the other posterior to the pectoral fold. The level, or interspaces punctured, depended on the position of the adhesions. In only one case was one cannula introduced in front below the clavicle and the other in the axilla. Many operators prefer these latter positions, and they are no doubt more convenient for apical adhesions, especially when using a Kremer direct vision thoracoscope. Operative and post-operative complications occurring in the 140 separate operations are listed in Table III.

TABLE III.
OPERATIVE AND POST-OPERATIVE COMPLICATIONS
(124 Cases - 141 Operations)

	<i>This series</i>	<i>Matson⁵ 206 cases</i>	<i>Chandler⁶ 157 cases 210 operations</i>
Spontaneous pneumothorax	3	4	0
Hæmorrhage, oozing	20	23	16
Hæmorrhage, moderate	3	3	2
Pleural exudates:			
Clear, new, trace	26	60	20
Clear, new, moderate	13		
Clear, increased	10		46
Clear, unchanged	7		
Clear, to purulent	4		
Purulent, new	7	11	7
Mixed infections included above (not all pleural fluids examined)	1	0	3
Septic empyema	0	0	1
Obliterative pleuritis	4		5*
Pleuro-cutaneous fistula	0	0	0
Subcutaneous emphysema, moderate or more	8		19

*In second half of series; 100 operations on 68 patients.

With us spontaneous pneumothorax has been the most dangerous. This occurred 3 times.

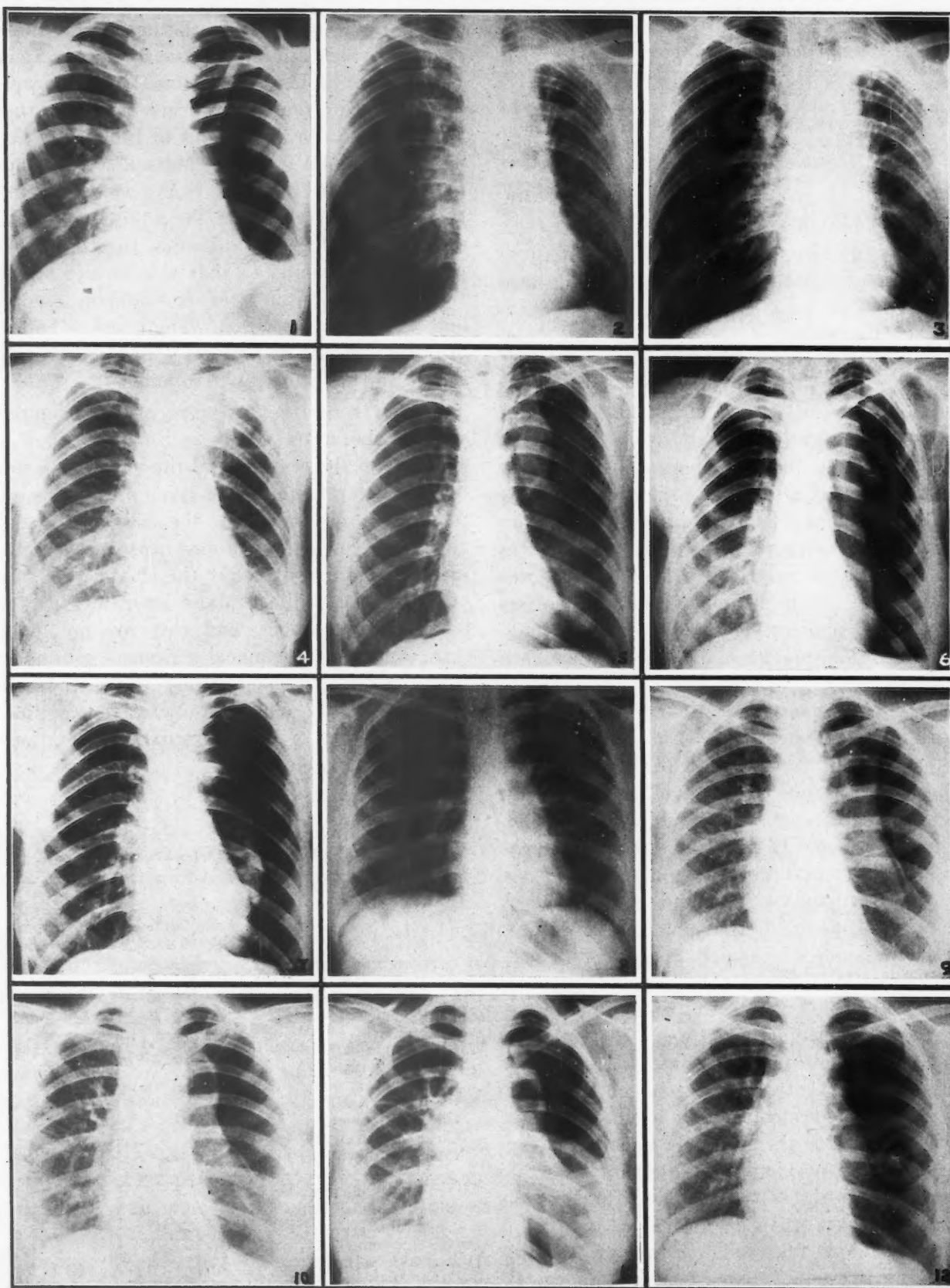


Fig. 1. Case 1.—X-ray of chest suggesting a cuttable adhesion. On thoracoscopy the long tongue of lung was found to be adherent along its entire length to the posterior chest wall and could not be separated by internal pneumonolysis methods. Fig. 2. Case 2.—X-ray of chest showing adherent lung or broad adhesion extending from lower edge of second rib to dome of thorax. It was considered doubtful that the lung could be freed. On thoracoscopy the upper lobe was found to be held out by extensive thin folds, easily cut. Fig. 3. Case 2.—Result—complete collapse of upper lobe. Sputum negative. These two cases illustrate the unreliability of x-ray studies in determining the type, extent and operability of adhesions. Thoracoscopy is the final arbiter. Fig. 4. Case 3.—November. Large cavity in left upper lobe. Fig. 5. Case 3.—February. Pneumothorax established. Cavity held open by one or more adhesions under second rib. Fig. 6. Case 3.—February. Irregular band adhesion cut at one operation. Cavity still open. Fig. 7. Case 3.—May. Cavity closed. Sputum negative. Fig. 8. Case 4.—November. Large cavity in left apex. Fig. 9. Case 4.—June. Pneumothorax established; cavity held open by broad adhesion under first rib. Fig. 10. Case 4.—July. Thick spool adhesion stretched out after a first-stage operation. Fig. 11. Case 4.—August. Adhesion completely severed at second operation; cavity still present. Fig. 12. Case 4.—November. Cavity closed; sputum negative.

One appeared, clinically, to have occurred 23 days after a second-stage operation. The patient died. No opening into the lung could be demonstrated at autopsy. This case had large bilateral cavities and a very poor prognosis. Another occurred the next day after a small short spool was severed at one operation. The adhesion was holding open an enormous apical cavity which the staff believed could not be closed by thoracoplasty. It was felt that considerable risk justifiably could be taken here to free the lung. The patient died and there was no autopsy. The third occurred 22 days after operation, was followed by a purulent exudate, and when the lung re-expanded the previous cavity (1½ inches in diameter) was closed and the sputum was non-bacillary. Mention should be made of a fourth case which had a persistent cloudy exudate after operation. A fatal spontaneous collapse occurred 20 months later. At autopsy the opening was found well away from where any cutting had been done and apparently had no relation to the operation. These all occurred in the first half of our series. In Matson's series of 206 cases 3 pulmonary fistulas and 1 spontaneous pneumothorax are recorded. Chandler, an internist, reports none in 210 operations on 157 patients.⁶

Hæmorrhage has not been serious. We have recorded as "oozing" cases in which there was the slightest reddish discoloration of one or both stumps. In no case was a spurter opened. In 3 there was a steady dropping of blood, and efforts to control this by grasping the bleeding point with the laryngeal forceps and connecting with the coagulating current were successful. In our experience the most bleeding has been from the costal stump of free adhesions and in partially cut folds. Bleeding within the chest from the puncture wounds was troublesome by fouling the lens of the thoracoscope in 2 or 3 cases. Matson reports 26 occurrences of hæmorrhagic exudate in his 206 cases, some done with galvano-cautery. Profuse bleeding occurred 3 times, 2 of which were before he used the cutting current with coagulating properties obtained from the Bovie unit. In 6 cases there was moderate bleeding during operation. In each the hæmorrhage was from a partially cut fold. Chandler reports oozing 16 times and 2 spurters opened in his 210 operations.

A moderate amount of serous exudate or increase in existing clear fluids occurred 23 times. Purulent exudate developed 7 times and clear fluid became purulent in 4 more. Other organisms were found in one (the third spontaneous case) which cleared up with repeated aspirations until re-expansion of the lung occurred. Unfortunately not all purulent fluids were examined. The result was only adversely affected in 4 cases which were followed by obliterative pleuritis. Matson's 206 cases developed serous exudate in 60 and purulent in 41. Chandler reports 20 slight and 46 moderate or more serous effusions in the second half of his series—100 operations on 62 patients. Tubercles on the pleura or any cut during operation play, we are convinced, an important rôle in the production of purulent exudate. We have not paid sufficient attention to the study of this complicating condition of the visceral pleura. In 2 such cases we saw ruptured tubercles with open craters.

In the classification of results there is considerable confusion. Some classify their cases in terms of the late result, using terms similar to the Result of Treatment classification of the National Tuberculosis Association. It seems to us that this method is more properly applied to the results of pneumothorax than to a step that is only an aid to that form of treatment. The more commonly used groupings are "technically" and "clinically" successful and unsuccessful. The former offers wide latitude in interpretation. Alexander suggests the terms "complete" and "incomplete" division of adhesions, which would seem an improvement over technically successful and unsuccessful. "Clinically successful" should not be open to different interpretations; it should mean only an inefficient pneumothorax turned into a satisfactory one and the patient's sputum rendered free of bacilli. There is some difficulty when there is open disease in the other lung.

Then again the time of classification after operation is important, as often for several months the result would be a success, only to have the patient again become sputum-positive. Others become free of bacilli only after a year or more. Probably it would be better to delay classification until termination of the pneumothorax, or after an arbitrarily chosen lapse of time, say, twelve months from operation.

This series has been classified as to results 6 to 12 months after operation. The results (Table IV) show that 70.1 per cent were clinically successful. This figure would be decreased if the 27 sputum-negative cases had not been attempted, as they might not have been by some operators, who would consider the pneumothorax satisfactory. Anderson and Alexander operated on 19 cases with "non-cavernous lesions or for lesions that formerly included a cavity".⁵

TABLE IV.
RESULTS IN 124 COMPLETED CASES

		Per- centage	Clinically un- successful		Clinically successful	
			Per- centage	Per- centage	Per- centage	Per- centage
Total cases.....	124		37	29.9	87	70.1
Complete division of adhesions.....	79	63.7	21	25.3	59	74.7
Incomplete division..	45	36.3	16	37.8	28	62.2
Two-stage operations included above....	17		10		7	
Complete division...	11		6		5	
Incomplete division..	6		4		2	
Sputum-negative cases included above....	27		3		24	
Complete division...	13		0		13	
Incomplete division..	14		3		11	
Matson ⁵	206		68	32.97	138	66.9
Technically successful	124		2		122	
" unsuccessful	82		66		16	
Moore's ⁴ collected cases, 41 operators...	2043			24.5		75.5

It is interesting to note that clinical success was achieved in 62.2 per cent of cases where the offending adhesions could not be completely severed. One was successful only after a later phrenic nerve paralysis. Of the 40 cases consisting of one or more strings, cords or brands, which were easily cut, only 31 were clinically successful. The 3 cases of failure in the sputum-negative group were classified thus, as no increase in collapse was obtained.

Studying the unsuccessful cases to ascertain the most common causes of failure resulted in the information given in Table V. Several factors were involved in some, but they seemed roughly to fall in to this grouping. Thick fold adhesions, which later experience indicates should not have been attempted, accounted for 9. This included the 3 sputum-negative

TABLE V.
CAUSES OF FAILURE

Cavity remaining open in spite of complete division of adhesions	11
Thick fold adhesions (should not have been at- tempted)	9
Obliterative pleuritis	3
Spontaneous pneumothorax	2
Progressive disease; no increase in collapse	1
Progressive disease with increase in collapse	7
Spread in contralateral lung	3

"failure" cases referred to above. If the 9 had not been tried but had been added to our rejected numbers the figure for this latter group would be 2.2 per cent, more in line with Stivers (Table II). Our tendency earlier in the work was to try to cut or destroy the pleura to allow stretching of thick folds or other adhesions that offered little prospect of success. We were too prone to try to do something to save the patient from a thoracoplasty in cases that should have been left alone.

Cavities remaining open after the lung was completely freed accounted for 11 failures. These are disappointing, as also are those where the failure is due to obliterative pleuritis. One of the 3 recorded under the latter heading became sputum-negative much later after a contralateral pneumothorax.

In a number of failures, bronchial ulcerations and stenoses were later found bronchoscopically and had a bearing on the failure just as these complications have in any pneumothorax series.

CONCLUSIONS

1. Closed intrapleural pneumonolysis is a necessary procedure in a program of collapse treatment of pulmonary tuberculosis.

2. It is a procedure justifiably within the field of physicians specializing in tuberculosis.

3. In an institution having 75 to 100 new pneumothoraces a year it would be advantageous to have one staff member become proficient in this work.

4. The results in 124 cases, 15 with a two-stage operation, are reported here: 70.1 per cent were clinically successful; 63.7 per cent of the total had complete and 36.3 per cent incomplete division of adhesions.

5. Spontaneous pneumothorax was the most dangerous complication. Hæmorrhage was not serious. Serous pleural exudates developed or increased in 46 cases; purulent followed in 11.

6. Greater uniformity in the time and method of classification of results is desirable.

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EXTRAPLEURAL PNEUMOTHORAX*

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THE use of extrapleural pneumothorax in the treatment of pulmonary tuberculosis has now the possibility of becoming a standard procedure. If one investigates, even roughly, the history of this mode of therapy it is found that the concept is of long standing and that it has been repeated off and on by many workers whose success varied until, for the most part, it fell into disfavour. Tuffier in 1893 had the original idea and performed extrapleural pneumonolysis for severe hæmoptysis. He repeated the operation again in 1912 and 1913. Following him, others made use of the same operation, attempting to maintain the space by injecting air. A number of these are mentioned by Alexander¹ in his recent book on pulmonary tuberculosis. In large measure it was found preferable to employ some material that might permanently fill the extrapleural space that could readily be established by operation, and so the use of fat, gauze, rubber, wax, etc., became relatively popular. Of course, these substances are foreign bodies which naturally give rise to the many complications following their introduction into areas that are close to the site of inflammatory disease. Recently, however, the use of extrapleural pneumothorax has been revived, particularly by Graf and Schmidt² in Germany. Their success has prompted others in France³ and later England⁴ to employ the same method. At the present time, in America, many clinics are making use of this operation, so that in a short time its degree of usefulness will become more definite.

Though it is yet too soon to make any final statement, it seems altogether probable that, for selected cases, this procedure is the one of choice. However, it is not likely that it will replace any of the present operations. Undoubtedly, in the

beginning, it will be employed where thoracoplasty might be indicated. Naturally, we should attempt to reduce the number of disfiguring thoracoplastic operations; but to replace thoracoplasty it is necessary to substitute a therapeutic procedure that can produce at least the same or a better percentage of arrested disease. Time alone will determine this point. It is with this view in mind that this paper has been written. After a rehearsal of the technique, the complications and sequelæ, some small data are available upon which to base an opinion.

The operation.—The patient can be operated on in the sitting position, using local anæsthesia, but more frequently the usual position for thoracoplasty is employed, with gas or a spinal anæsthetic. Through a paravertebral incision the fourth rib is resected sub-periosteally for a distance of some four or five inches. The intercostal muscles of the third interspace are then freed from their attachment to the superior margin of that portion of the periosteum of the fourth rib that remains. By doing so one more readily comes upon the parietal pleura, and is able to free it readily in a cleavage plane of loose areolar tissue. Using the index finger, the parietal pleura internally is separated from the rib-periosteum and intercostal muscles externally. A space is thus formed—the extrapleural space. Beyond the limits of the finger some other method of separation is employed, such as a small piece of gauze on the end of a forceps. Illumination, either by a Cameron lamp or a spatula with a small electrical globe, is imperative. It will be found that multiple bleeding points are encountered. These can be electrically coagulated or compressed sufficiently by a gauze sponge to stop the bleeding. The space is enlarged until the pleura is stripped from the apex, anteriorly and posteriorly, until as much of the lung is mobilized as is considered diseased. Through this opening in the chest, the lung can be separated to the 8th or 9th rib behind

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and to a corresponding level in front. In the spinal gutter the separation is generally difficult, particularly in the fibrotic cases. Care should be exercised in freeing the apex on its mediastinal side not to injure the innominate veins. Should the operation be done when intrapleural pneumothorax is present a rupture of the parietal pleura is apt to occur anteriorly. This, of itself, should cause no difficulty. Finally, the chest is closed as tightly as possible by suturing the intercostal muscles. The superficial muscles and skin are closed in the usual manner.

After-care.—It is advisable to give the initial refill while the patient is still on the operating table. The pressure is made slightly positive. That night and again the next day the procedure is repeated. For the most part the oscillations of the water manometer are less than in the case of intrapleural pneumothorax. The quantity of air injected before the pressure becomes positive is small, generally 75 to 200 c.c. The day after operation a hæmorrhagic serum has accumulated. This must be removed, and repeatedly, until it ceases to form. The refills are later reduced to every second day, twice a week, and, finally, once a week or every ten days. An attempt is made to keep the pressure in the space well on the positive side. This is most important on the days immediately after operation. A positive pressure of from 10 to 20 is not too great. Repeated x-ray examinations are advisable.

Complications.—Because the bulk of this operation consists in breaking down the junction of two membranes that normally are bound closely together, there is, of necessity, the rupture of a great number of capillaries, small arterioles and venules. By means of coagulation any free bleeding is controlled, but there remains the exudation of a great quantity of hæmorrhagic serum. In certain instances this fluid loss of serum and cells is sufficient to simulate actual secondary hæmorrhage. For the most part this occurs within a few hours of the operation, but it may continue for even days. Hence, the necessity of the removal of this material while it is still fluid, in order to prevent its coagulation with consequent adhesions of an obliterating type. Actual death from bleeding is rare, but anæmia of considerable degree is common.

Infection of the space may be of two types. Pyogenic infection may result from the operation itself, secondary contamination following

repeated aspirations or the introduction of a drainage tube, as was done in the early cases. Tuberculous infection may come from a failure to follow the cleavage plain, a tearing of the lung resulting. It may result, too, from a vigorous attempt to break down dense adhesions. The formation of a fistula, days or weeks after the operation, may be caused by the loss of blood supply to the peripheral wall of the cavity or diseased portion of the lung that was formerly supplied by blood from small radicles in the chest wall itself.

The treatment of the pyogenic infection is the same as that employed elsewhere. It calls for dependent drainage. Should a chronic cavity persist some type of thoracoplasty may be necessary.

The tuberculous fistula may heal spontaneously after some type of drainage; or it may eventually require extensive rib-section.

Emphysema of the subcutaneous tissues is not nearly so extensive as one would expect. Indeed, it is not more than is experienced after a closed intrapleural pneumonolysis. Mediastinal emphysema and air embolism have not actually been experienced to date.

Spread of the disease, either in the same lung or on the contralateral side, must be anticipated with some considerable degree of frequency. This is to be expected in the early exudative cases, partly because an extensive collapse is established relatively quickly and the resulting liberation of toxic substances may either initiate new disease or reactivate a focus that was formerly inactive. The same consequences are to be expected in this regard as have been so frequently experienced in ordinary artificial pneumothorax.

Though not actually a complication, the desired result may not be attained through failure to perform a sufficiently extensive operation at the time. Perhaps as important a consideration is the immediate after-care in the matter of the maintenance of the space. Secondary operations to enlarge an inadequate extra-pleural space have proved quite satisfactory, but the re-establishment of an already obliterated space may prove a more difficult matter. Bilateral operations may be performed in those cases where there is bilateral disease of a type that might be expected to respond favourably to pneumothorax.

Certain operators have recommended filling the extrapleural space with saline at the close

of the operation. This has been advised with a two-fold object: it prevents the coagulation of the hæmorrhagic serum and facilitates its removal. At the same time the pressure of the fluid thus introduced aids materially in maintaining a maximum of collapse.

While it is relatively easy to separate the parietal pleura from the chest wall anteriorly, it must be borne in mind that, posteriorly, the adhesions may be so great or inaccessible that the operation should be abandoned and some other type of collapse instituted. In this connection, it may be found that, after the loss through obliteration of an ordinary intra-pneumothorax, the establishment of an extra-pleural space may be unusually difficult and probably should not be attempted.

An analysis of the air in the intrapleural space compares almost identically with that in the intrapleural area. The oxygen and CO_2 , after sufficient time has elapsed for diffusion to take place, remain at the same tension as is maintained in other tissues. Spontaneous pneumothorax may be demonstrated by a rise in the oxygen tension. A fall of oxygen tension below the normal is indicative of some infection in the space.

Apart from the anæmia that follows operation there is no great disturbance to the patient. He remains relatively comfortable without undue dyspnoea. There is not the opportunity for paradoxical breathing and shifting of the mediastinum with each respiration as is possible after thoracoplasty. The chest wall remains rigid, and the positive pressure over the inside of the chest stabilizes the mediastinum at a more or less constant pressure.

There is, as a rule, a moderate degree of fever which reaches its maximum in about 48 hours and gradually falls to normal again in about ten to twelve days. Febrile patients who are subjected to operation have a slight increase in temperature *and*, in favourable cases, a tendency to fall within two weeks.

The pulse, as a rule, follows the temperature. It is likely moderately quickened before operation, rises somewhat, but never to alarming levels unless the exudation of hæmorrhagic serum into the extrapleural space becomes excessive. In such instances the pulse may rise to 150 or 160; the blood pressure may fall to 70 or less; the patient becomes pale, weak, and cold, with sighing respirations. Consequently, even

with the aid of daily x-rays, or every second or third day, it is advisable to keep a record of the pulse and blood pressure at frequent intervals until they become stabilized.

Cough is not greatly interfered with. The amount of pain experienced is far less than that after thoracoplasty. Consequently the patients can and are willing to cough. If a good collapse is attained, the cough may cease in a few days. There are practically never the distressing spasms of cough with pain that so frequently follow thoracoplasty.

At the present time there are few data on the actual functional results of this operation. The reduction of lung volume will correspond fairly well with the amount of collapse obtained. In unilateral cases the reduction is never likely to reach alarming levels but in bilateral cases, when this operation is performed on one side and thoracoplasty on the other, great care must be exercised in reducing the vital capacity. In a general way, one would expect less disturbance of function than is found after thoracoplasty. The same physiological response as follows ordinary artificial pneumothorax may be looked for. The later changes in lung volume and respiratory function must be determined by the course of the lung disease, the tendency of the extrapleural space to enlarge or, more likely, to become smaller. Changes in venous pressure may be anticipated in the bilateral cases.

What is the ultimate fate of the space created by extrapleural pneumonolysis? This will be determined by a variety of conditions. If the initial space that has been created is small it will slowly become obliterated and the collapse lost. If much bleeding occurs or coagulation takes place, tending to partially obliterate the cavity then, too, the space will tend to become smaller, and sooner or later the lung will completely expand. In favourable cases, where adequate collapse has been obtained, it may be possible to maintain the space for months and even years. Certain secondary operations that have been performed six months or more after the primary operation have shown the extrapleural space to be lined by a tough, glistening white membrane some millimetres in thickness. Consequently, the length of time this space will persist will depend upon the thickening of the tissues lining the space. There will be a tendency in any case for an obliterative condition to develop, but it may reach a state that

becomes more or less chronic with a persistent cavity remaining. What will need to be done to this will be determined by the condition of the patient, the type and extent of the underlying lesion for which the collapse was instituted, and the length of time the collapse has been maintained. Some lesions in the parenchyma will be cured, the lung allowed to come out or to fill with fluid and re-expand as the fluid becomes absorbed. In other instances it will be possible to demonstrate an uncollapsed cavity, in which case the extrapleural air filling may need to be abandoned and some other method of collapse used instead.

The Germans and the French have advised the introduction of oil when the cavity has stiffened its walls sufficiently and there is a tendency for the lung to re-expand. The oil is introduced by the same method as that employed in intrapleural oleothorax. The complications that follow this procedure are stated to be rare. In this country oleothorax has not found general acceptance, and it will take further experience with this mode of collapse therapy before its routine use will be recommended.

Indications.—Having now in mind the operative technique, the after-care and the complications that may be anticipated, one is in a position to speculate as to the type of case that might be expected to be cured, arrested, improved, or unimproved, as a result of this therapeutic measure. One's first impressions are to place in the surgical category all those patients who cannot take intrapleural pneumothorax and are still not prepared sufficiently for thoracoplasty. This group would include a large number of sanitarium cases which for the time being are only able to obtain bed-rest therapy. Indeed, it is in this group that most benefit is to be expected from this operation. In other words, it may be stated that this operation may arrest the disease in one group, while its use in the case of large cavities in the lung, or those with small cavities and much fibrosis, may be largely that of a temporary or preparatory undertaking, with the final object being a more permanent collapse.

It is necessary to know, as exactly as possible, what can be expected by this method of treatment before exposing patients to a rather serious operation, and, in the end, to have accomplished only a partial improvement. It is probably wise to state that, from the surgical viewpoint, this operation must be considered a very serious one.

The dangers from hæmorrhage, infection and fistula are very great indeed. The operation must be done with great care, else the complications may prove even more serious than the initial disease. The complications of the already reported cases, when estimated in percentages, are unusually high as compared with other thoracic operations.

It is extremely doubtful if any of the acute exudative tuberculous lesions, as a group, will do well, though occasional cases may, under extrapleural pneumothorax. Once the fever subsides, the pulse falls, or there is even the suggestion that slight cavitation is present, should the ordinary pneumothorax fail, then an extrapleural filling may be considered. To such cases can be added those . . . that have already been treated with artificial pneumothorax, but, the adhesions at the apex being too extensive to sever by cauterization, there remains inadequate collapse that may be obtained by an extrapleural pneumothorax. Indeed, there is no reason why the extrapleural and the intrapleural spaces may not be made to communicate, particularly if there is disease at the base of the lung.

Another indication is pulmonary hæmorrhage, which was the actual reason that prompted the first operation by Tuffier.

Because extrapleural pneumothorax is essentially a selective collapse it may be used in limited, chronic, bilateral cases. It is questionable how valuable it will prove in chronic bilateral cases with rather extensive cavitation, or even in unilateral cases with extensive cavitation, where thoracoplasty would be a far more reasonable procedure. It might be considered, too, in the control of disease in the contralateral lung that may follow artificial intrapleural pneumothorax or even thoracoplasty, when it is impossible to collapse the lung on account of pleural adhesions.

Our experiences at McGill have been with only 9 cases. This is a small number but sufficient to reveal the dangers and the value of the operation. The patients have only been subjected to operation where it was thought that other measures were not indicated and that extrapleural pneumothorax might be of greatest value. There have been no deaths. Two of the patients have had rather alarming post-operative hæmorrhage. One responded to aspiration, but the second continued to bleed, the blood oozing out through the muscular incision and finally burst-

ing externally. Naturally, the wound became secondarily contaminated and dependent drainage was required.

Our first patient was over fifty years of age, had a small cavity in the right apex, a sputum positive for tuberculosis, and he bled occasionally. He was a big man with a large frame and emphysematous chest. Artificial pneumothorax was impossible. An extrapleural filling with air was done seven months ago. The space created, though it appeared large at the time, was lost in three months, largely by the formation of clot with organization of the same in the base of the extrapleural cavity. Nevertheless his sputum has become negative and he has not bled.

One patient had carried an artificial pneumothorax for one year when it was lost. An extrapleural filling was done, but the operation was unusually difficult on account of the adhesions. A fair collapse was obtained, but it is doubtful if the space will be adequate or able to be held sufficiently long for healing.

One patient, about fifty years of age, with a large apical cavity, was treated by pneumothorax which collapsed the base of the lung, but extensive adhesions at the apex persisted, too bulky to be cauterized. An extrapleural filling was done, a good collapse obtained,

and the extra and intrapleural spaces were made to communicate. Her condition has improved but the sputum is still positive. It is likely that this case was not chosen correctly and should have had a thoracoplasty which may yet need to be done.

The remaining cases have done well but, like others who have been interested in this procedure, we think it yet too soon to pass any final judgment. It is probable that extrapleural pneumothorax will remain an instrument in the hands of the thoracic surgeon, but that time will show that its usefulness is confined within rather precise limitations.

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BRONCHIECTASIS AND TUBERCULOSIS IN RELATION TO NASAL SINUSITIS*

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UNTIL quite recently very few physicians seem to have thought of the respiratory tract as being one continuous system. Judging from the literature and the general attitude regarding chest infections, one might almost come to the conclusion that the upper and lower respiratory systems were in separate air-tight compartments.

The recognition of bronchiectasis dates back to 1819¹ and of nasal sinusitis almost as long; yet it was almost a century later when a possible connection between the two was first pointed out by Sir StClair Thompson.² He observed that the amount of secretion in bronchorrhœa was influenced by the treatment of the accompanying sinusitis. Two years later Rist³ and Sergeant,⁴ French army surgeons, demonstrated that many of the French soldiers, who had been diagnosed as having tuberculosis, were really suffering from non-specific chest infections secondary to nasal sinusitis. Webb and Gilbert,⁵ of the American Expeditionary Force, arrived at a similar conclusion.

These early observers were still voices crying in the wilderness, until the work of Mullin and Rider,^{6, 7} 1919 to 1921, demonstrated definite connections between the nasal passages and the lungs, both by lymphatic absorption and by direct inhalation. These observers injected the antra of rabbits and the frontal sinuses of cats with India ink. They definitely proved the continuity of lymphatic drainage from the sinuses by tracing the ink after the animals were killed. They found that the lymphatic drainage of the antra was by way of the submaxillary and retropharyngeal glands, to the internal jugular nodes and deep cervicals, thence, via the lymph ducts, to the great veins, right side of the heart, and through the pulmonary artery to the lungs. The drainage from the lungs was taken up by the pulmonary lymphatics, which converge towards the hilum and drain into the tracheo-bronchial glands.

The possibility of pulmonary infection secondary to sinusitis, by direct contamination, was also demonstrated, by allowing India ink to flow into the nostrils of rabbits and take its natural course. The respiratory tract was then examined. The ink was found all along the

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tracheo-bronchial tract to the terminal bronchioles and alveoli. Suspensions of tubercle bacilli and other pathological bacteria were used in the same way, with similar results.

With the publication of these experiments, interest in the possible causal relationship of upper and lower respiratory infection became general, although still mainly confined to this continent. In an incomplete review of the literature, one finds 76 articles in American journals, 8 French, 6 German, 3 Italian, and only 2 in Great Britain, although there are 6 Australians and several articles by Canadians, usually in United States journals.

Two Canadians, the late W. E. Rowley and H. A. Farris, were pioneers in this field. Unfortunately they did not report their work, but in 1921⁸ and 1928⁹ I reported a few of the cases we had studied together. At that time we reached the following conclusions: (1) that many chest infections which had been previously considered tuberculous were in reality non-specific infections; (2) that most of these non-specific pneumonitis cases were associated with upper respiratory tract infection; (3) that the pneumonitis would not clear up so long as the upper respiratory tract infection persisted.

Confirming the work of Mullin and Rider, Quinn and Meyer¹⁰ dropped iodized oil through catheters into the posterior nares of 11 sleeping patients. In 5 oil went into the lungs. McLaurin¹¹ showed that lipiodol injected into the nasal sinuses appeared in small amounts in the bronchi 24 hours later. G. E. Pfahler¹² injected lipiodol into both antra, and ten weeks later demonstrated globules of lipiodol in the lymph chain to the thoracic duct on the left and to the right lymphatic duct. Myerson bronchoscoped 100 children immediately after tonsillectomy under ether and found blood in the trachea in 97 per cent.

Spread of infection through direct continuity is another probable mode of infection of the lungs. Clerf¹³ states that there is usually associated with chronic sinus infection a chronic laryngo-tracheo-bronchitis, which in turn may cause a bronchiectasis. McLaurin¹⁴ mentions the hæmatogenous route where infection is carried directly through the blood stream to the lungs.

There are thus four possible routes by which infection may travel from the nose to the bronchi, *viz.*, by aspiration, by direct extension,

via the lymph stream, and by general blood stream infection. Where there is a chronic profuse post-nasal discharge undoubtedly aspiration is the main source of contamination. If a foreign substance like lipiodol can get by the guardianship of the larynx without arousing the cough reflex, certainly a nasal discharge to which the larynx has become more or less insensitive can do so. In the writer's opinion this is, in the great majority of cases, the route of infection, for, as Sluder pointed out long ago, even when no post-nasal discharge is seen on ordinary examination, a thin translucent veil of discharge over the pharynx may be discerned under brilliant illumination.

This is the droplet type of infection described by McLaurin. Mucopurulent material finds its way out of the sinuses into the nasopharynx; some of it drops through the larynx into the trachea, thence into the bronchi and bronchioles. The mucous membranes of these structures then become infected and begin to produce discharge themselves. A diffuse bronchitis develops. If this persists long enough there will ensue dilations of the bronchi and in time a true bronchiectasis. In hyperplastic sinusitis, where there is little or no discharge, the infection is probably carried by the lymphatics.

In spite of the work of Mullin and others, this route of infection has not been universally accepted as proved. One phenomenon which needs explanation is that cervical adenitis, so frequently seen in tonsillitis and pharyngitis, is seldom seen in chronic sinusitis.

The fact that adenitis seldom manifests itself seems at first a serious argument against the lymphatic route. We must always remember, however, that we are dealing with a chronic infection, in which the organism has become attenuated. Frequently in these cases one may find the antra almost filled with thickened degenerated membrane, and yet the culture will be sterile. Only when the membrane is ground up and cultured is the organism obtained. In these cases the organism grows within the membrane itself. These attenuated organisms act very like tubercle bacilli when passing through the tissues. Their mode of passage has been indicated by the illuminating research work of Nonnidez and Kahn¹⁵ on tadpoles. In their experiment they found that the non-motile tubercle bacilli rode quietly through the intestinal membranes and vessel walls in the bodies of the macrophages

which ingested them. There was no local disturbance unless the bacilli were in overwhelming numbers or were delayed in one locality long enough to multiply. Usually the bacilli all found their way to that great sieve, the lungs. It is presumed that a somewhat similar process takes place in man.

Granted contamination of the bronchi from nasal infection, is this sufficient to produce bronchiectasis unaided by constitutional causes? Undoubtedly constitutional causes frequently exist. With congenital syphilis, endocrine dyscrasia, lack of vitamins, or bad climatic conditions, infection would naturally be easier and the bronchial walls weaker.

In this connection it is interesting to consider the observations of Kartagener and Ulrich¹⁶ on development of the skull in patients with bronchiectasia. They noted that 19.8 per cent of these cases showed absence of frontal sinuses as compared with only 4 per cent in a control group. These findings indicate a developmental anomaly. They compare with the observations of Mortimer, Wright and Collip,¹⁷ showing faulty aeration of the skull in cases of atrophic rhinitis and oto-sclerosis.

Undoubtedly these various factors which prepare the soil make infection easier, but constant dropping will wear away stone, and repeated contamination from a discharging nose will, I believe, infect the healthiest bronchi. We have all seen children brought up in the best surroundings, with good physique, develop into these naso-bronchial cases, after the establishment of a chronic nasal discharge.

Keen observation and systematic studies in roentgenology of the chest have done much to clarify the relation of upper and lower respiratory tract infection. Manges¹⁸ has made it a custom to have roentgenograms of the sinuses of patients sent to him for examination of the lungs, in whom he could find no evidence of tuberculosis, but who showed evidence of other infectious processes. Hodges¹⁹ has taken a sinus film of every doubtful chest case for fifteen years.

Wasson²⁰ makes interesting comparisons in the roentgenograms in tuberculosis and in broncho-sinusitis disease. These observers and others have long recognized a fairly definite x-ray picture of the chest which seems to be associated with nasal infection. This consists in an increase in density of the hilum, the peri-

bronchial and perivascular markings, combined with greyish shadows at the base of the lung. These basic shadows are confluent with the hilum shadow, extend downward along the border of the mediastinum to the diaphragm, and outward towards the periphery along the shadow of the diaphragm, thus forming a triangular shaded area. The term "pneumonitis" has been applied to this condition. Such a roentgenogram is sufficiently typical to enable a roentgenologist to foretell with considerable accuracy the condition of the sinuses from a study of the chest plates.

The coincidence of sinusitis and chest infection reported by various observers varies from 55 to almost 100 per cent. Casaubon²¹ in a series of 35 cases of bronchiectasis finds 50 per cent due to a predominant infection of the nose and pharynx and only 35 per cent free from lesions of the naso-pharynx. He emphasizes the fact that the cause in its classical form seems of little importance. It is the repetition of infection and its continuous persistence in the nose and throat which, in spite of seeming insignificance, leads to bronchiectasis. McLaurin²² states his belief that almost 100 per cent of all tracheo-bronchitis, bronchitis, bronchiectasis and peribronchial cases are directly dependent upon some type of chronic sinus disease, with the exception of specific types of lung infection. Quinn and Meyers found 77 per cent of the cases of chronic sinus disease had bronchiectasis and Manges found that 85 per cent chronic sinus cases had roentgen-ray evidence of lung changes. Clerf²³ studied 200 patients with bilateral bronchiectasis, and found 82.4 per cent with sinus disease, and Hodge²⁴ found 75 per cent had associated sinusitis.

Our own observations have been drawn from the Saint John Clinic for Tuberculosis. For many years the medical staff of this clinic have noted a group of patients who were characterized by symptoms very suggestive of tuberculosis, but who were found on examination to be suffering from non-tuberculous chest infection, usually associated with sinusitis. These patients presented themselves with a definite symptom-complex, consisting of fatigue, often intensive and seemingly out of proportion to their physical appearance, some loss of weight, loss of appetite, headache, and a persistent low-grade fever. With these symptoms there was a history of frequent head and chest colds that seemed to merge into one another over a period

of three or four months, especially in the fall and winter. They had cough and sputum that persisted throughout this period. One will readily see the similarity of these symptoms to those so commonly associated with tuberculosis. This difficulty in diagnosis led us to examine thoroughly the upper respiratory tract in addition to examining the chest in this type of case.

During the seven years from 1931 to 1938, 4,005 new patients were examined in the Tuberculosis Clinic; 2,670 were found to be non-tuberculous. From these 597 were selected as presenting symptoms indicative of sinusitis, their nasal passages were examined, and x-ray films of the para-nasal sinuses made. Three hundred and fifty-two, or 59 per cent of this selected group, showed definite evidence of sinusitis. These figures at least demonstrate that by a careful consideration of the history and symptoms alone, sinusitis may be spotted with some degree of accuracy.

A thorough study was made of some of these patients who were subsequently treated at the Saint John Tuberculosis Hospital during the above-mentioned time, a period of seven years. They fall into the following groupings.

TABLE I.

Bronchiectasis (58)	28 of these demonstrated neither obvious pneumonitis or sinusitis. 4 had an associated pneumonitis. 5 demonstrated both pneumonitis and sinusitis. 21 with sinusitis alone.
Pneumonitis (36)	16 without bronchiectasis or sinusitis. 11 with sinusitis. 4 with bronchiectasis. 5 with bronchiectasis and sinusitis.
Sinusitis (68)	31 without bronchiectasis or pneumonitis. 11 with pneumonitis. 21 with bronchiectasis. 5 with bronchiectasis and pneumonitis.

There are 14 patients in whom sinusitis did not seem to be associated with their bronchiectasis. From the history of these patients the following conditions preceded the onset of diagnosable bronchiectasis: asthma, in 3 patients; gassing overseas in 2; abscess associated with foreign body in 4; chronic pulmonary tuberculosis in 4; pneumonia in 1.

It may be of interest to you to know just what proportion of these patients were treated surgically.

In children, 1 to 10 years, a total of 28 patients had one or more of the three conditions: bronchiectasis, sinusitis and pneumonitis. It was felt desirable to do simple drainage on 7. In the adult group, 20 years and over, 70 patients fell in the above group and 5 patients had simple drainage, 8 radical surgery and 8 were advised to have simple drainage elsewhere. The number of patients treated surgically was so small that no definite conclusion may be drawn as to the permanent value of such procedures. However, we feel that in the patients with sinusitis and pneumonitis definite and permanent improvement was obtained. The response in the bronchiectasis cases was not so striking.

Until we know what proportion of our population in all age-groups have sinusitis it is impossible to state whether patients with tuberculosis have an unusually high percentage of sinusitis. We see no reason to suspect that this is so. Of our 116 proved cases of sinusitis, pneumonitis or bronchiectasis, only 5 children had definitely active tuberculosis. Of the adult group 24 patients had tuberculosis.

All observers remark on the quiescent nature of chronic sinusitis and the frequency with which it is overlooked. This is true of nearly every

TABLE II.
A TOTAL OF SOME 116 PATIENTS HAVE BEEN TREATED AT THE SAINT JOHN TUBERCULOSIS HOSPITAL, WHO FALL INTO THESE GROUPS

Age incidence	Sinusitis	Pneumonitis	Bronchiectasis	Bronchiectasis and pneumonitis	Sinusitis and bronchiectasis	Pneumonitis and bronchiectasis	Sinusitis pneumonitis bronchiectasis
1 to 10 years	6	9		8	2		3
11 to 20 "	3	5	2	3	3		2
21 to 30 "	8		3		3		3
31 to 40 "	10		3	1	6	1	2
41 to 50 "	6		7		6		1
Over 51 "	3	1	1		4		1
	36	15	16	12	24	1	12

The significance of this table is that in the later age-group there is an increasing number of patients with bronchiectasis with or without an associated sinusitis. Of the total number you will note that 37, or 32 per cent, of a total of 116 demonstrate bronchiectasis associated with either sinusitis or pneumonitis, or both.

chronic disease, unless one is carefully watching for symptoms. The symptoms of sinusitis are fairly definite if one is on the look-out for them. One must remember that the start of these infections is usually in childhood, even in infancy. The more common symptoms are: (1) Cough. This is a typical throaty cough or clearing of the throat. It is frequently entirely subconscious, and may be denied by the patient even while one is observing it. (2) Fatigue. There is a peculiar depressing fatigue that makes these patients seem always tired. (3) There is a slight fever when exacerbation of the sinusitis occurs, especially in children. (4) There is a history of frequent colds easily acquired.

Along with these symptoms there are nausea, poor appetite, nasal-discharge, asthma, headache and general depression. A patient presenting these symptoms should certainly lead one to suspect a sinus infection.

Bronchiectasis is also frequently quiescent and overlooked, as shown by Ochsner.²⁵ He reports a series of apparently normal students examined at the University of Wisconsin, all of whom complained of chronic bronchitis, or were subject to attacks of acute bronchitis. When examined bronchographically 95 per cent of these apparently normal persons, complaining only of bronchitis, showed definite evidence of bronchial dilatation. He concludes that bronchiectasis occurs much more frequently than is generally supposed and is without any doubt the most frequent pulmonary infection.

Underlying causes usually associated with these symptoms are vitamin deficiency, endocrine dyscrasia, lack of sunshine, poor hygiene, and poor climatic surroundings. Locally there is poor nasal aeration, usually adenoids, or a history of adenoids, and a red granular pharyngeal wall. Careful bacteriological and cytological study, with aspiration of the antra when indicated, will clinch the diagnosis. A proper roentgenogram is of the greatest assistance.

Treatment of these cases must be commenced early and followed through tirelessly. The entire constitution must be built up, with proper diet and rest, especially bed rest, and sunshine or sunlamp. Locally, improved aeration is sought by the removal of any adenoid tags, and shrinking and packing of the nostrils. If discharge persists, irrigate the antra. This is a very simple procedure if done through the normal ostium or one of the accessory ostia. It

is safe and painless if done gently and the tissues are not inflamed, and can be done even in young children, once confidence has been obtained. Vaccines are often helpful. Should these methods fail to clear up the discharge, x-ray therapy may be tried. Personally, I have had a very limited experience with it, but recent reports on results are very favourable. Finally, if all else fails and the discharge persists, resort to thorough surgical measures.

CONCLUSIONS

1. A considerable percentage of patients presenting themselves at a clinic for tuberculosis are suffering from non-tuberculous pulmonary and upper respiratory difficulties.

2. There is a close relationship between sinusitis, pneumonitis, and bronchiectasis, and we believe that a more accurate diagnosis of sinus infection should be made early in life and every effort made to provide adequate treatment.

3. It is difficult to evaluate the relationship of sinusitis in tuberculosis or the influence of a pre-existent upper respiratory infection as a factor in the cause of a breakdown. One would naturally argue that the lowered resistance would be important. We, however, do know that the removal of septic foci in a patient with tuberculosis is productive of more rapid recovery.

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DEFINITION OF BLINDNESS AND STANDARDS FOR SIGHT-SAVING CLASSES

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A PERSON with no perception of light is undoubtedly blind, but, of course, this definition has no practical value. The ability to distinguish light from dark removes him from this category. The ability to count fingers at any distance is of much greater value, as it allows him to get around a little. For our purposes we desire to standardize, if possible, the amount of sight necessary to enable the individual to do any work for which sight is required.

Many conventions and committees all over the world have dealt with this question, and among the first was the Ophthalmic Section of the Royal Society of Medicine in 1914. Their report stated: "The definition of blindness should read, 'too blind to perform any work for which eyesight is essential'." Experience shows that persons with vision below 3/60 Snellen are usually unable to perform work requiring eyesight, while persons with vision better than 6/60 are usually able to perform some such work. Persons with intermediate degrees may or may not be able, depending upon their intelligence, bodily health and the nature of the blindness. Such blindness depending on defects in the centre of the field may not reach a certain standard of vision, yet the patient may be able to walk alone or to do some kind of work requiring eyesight, while another with more vision but greater contraction of the field may be unable to get about alone or do any work requiring eyesight.¹

In 1933, the Ministry of Health in England adopted for the purpose of the Blind Persons Act, the original definition of blindness: "so blind as to be unable to perform any work for which eyesight is essential". Only the visual condition is taken into account and other bodily or mental infirmities are disregarded.

Classification is carried out in three groups: (1) Those with visual acuity below 3/60 Snellen are regarded as blind; (2) those with 3/60 Snellen, but below 6/60 Snellen, are regarded as blind if accompanied by considerable contraction of the visual field, but are not accepted if no contraction in the field is present and the visual defect is of long standing, *e.g.*, cases of nystagmus (congenital), albinism, myopia, etc. (3)

those with 6/60 Snellen or above are not considered blind unless there is marked contraction of the visual field and particularly in its lower part; but a person suffering from homonymous or bitemporal hemianopia retaining central visual acuity of 6/18 or better is not to be regarded as blind.² Würdemann states that for practical purposes blindness exists where the central vision of one eye is 6/60, with a deficient visual field, the other being inferior to 3/60, or that vision of less than 3/60 Snellen in each eye means economic blindness. He also states that paralysis of all muscles of both or of the working eye constitutes total disability.³

The House of Delegates of the American Medical Association, in 1925, set the minimum limit for muscle function as the presence of diplopia in all parts of the motor field, which, they said, constitutes zero visual efficiency.⁴

The Section of Ophthalmology of the American Medical Association, meeting in Cleveland in 1934, defined blindness as follows: (1) total blindness, as the inability to see light; (2) economic blindness, as the inability to do any kind of work where sight is essential, and this was considered to be a visual acuity of less than 6/60 Snellen in the better eye or an equally disabling loss of the visual field; (3) vocational blindness, as impairment of vision that makes it impossible for a person to do work at which he had previously earned a living. They suggested this vision might vary from 6/60 to 6/18 Snellen, depending on what is required for the occupation in question; (4) educational blindness is described as such loss of sight as makes it difficult, dangerous, or impossible to learn by the methods that are commonly used in schools, thus requiring sight-saving classes and schools for the blind. For sight-saving classes a visual acuity of 6/60 to 6/24 with glasses was recommended and for the school for the blind, less than 6/60.⁵ It is unfortunate that no comment is made as to what degree of visual field contraction constitutes "an equally disabling loss of visual field" in their definition of economic blindness, but it is generally accepted, of course, that fields contracted to 5 degrees reduce the visual efficiency

to zero. Also the suggestion that 6/60 to 6/18 Snellen be visual standards for vocational blindness would seem scarcely practical.

The indemnity tables for losses of vision for the Veterans' Bureau of the United States Treasury Department state that a vision of less than 3/60 in an eye will be considered as equivalent to total loss of vision in that eye, and similar rules apply to Great Britain, France and Italy. Ophthalmological societies have established committees at various times to consider the rating of visual losses and it is generally conceded that a person with 10 per cent (6/60) Snellen or less is entitled to 100 per cent economic disability.³ The law governing pensions for the blind introduced in Canada in 1937 is based on the original definition and states that: (1) the test is not whether the person can follow his ordinary occupation or any particular occupation, but whether he can perform any work for which eyesight is essential; (2) only the visual condition shall be taken into account and other bodily or mental infirmities disregarded; (3) the principal condition to be considered is the visual acuity as tested by Snellen's type, using proper refractive lenses; (4) persons with visual acuity equal to or less than 6/60 Snellen after correction by glasses shall be certified; (5) persons with acuity of more than 6/60 Snellen after correction shall not be certified.⁶

Each applicant must be examined by a duly qualified medical practitioner with special experience in ophthalmology. In practice, applicants with cataract, detached retina and some other conditions are accepted for pension, with recommendation for re-examination after such a date as operation to improve vision might be performed. The law does not compel the pensioner to have the operation performed, however. Acute and subacute inflammations such as iritis, choroiditis, keratitis and retinal hæmorrhages are dealt with by deferring decision for a time till the ultimate outcome may be reasonably foretold, at which time re-examination is carried out and pension, if granted, would probably be retroactive. On July 1st in Canada over 3,000 applicants were receiving their pension for the blind.

We accept without question as the definition of blindness, "too blind to perform any work for which eyesight is essential", but difficulty arises when we attempt its application. With no other guide, the examining eye physician

would have to decide whether the individual case complied, and for this he would require considerable insight into human abilities and the problems of life in general. Then, if we say vision of 6/60 or less constitutes blindness complications are bound to arise. The farmer with 6/60 visual acuity from any cause can contribute a great deal in the way of general labour around the place, while the mechanic suddenly deprived of vision to the same degree is at a loss to carry on work of any kind. Again, a man with no better than 6/60 vision all his life is in a much better position than one who in middle life loses his sight.⁷

This standard of 6/60 Snellen or probably any numerical standard, while undoubtedly of great assistance for administrative purposes, does not exactly represent the condition described by the definition of blindness, but when we consider the scattered territory of the Dominion and the difficulties encountered in organizing and financing the examinations carried out by eye physicians of varied training it is probably safer and better than accepting the judgment of each examiner. I believe that as organization is perfected and experience acquired the regulations may be altered, and that the opinion of the Canadian Ophthalmological Society as to the best application of the definition would be of great value.

The educationally blind are those whose vision, after correction by glasses, does not enable them to read ordinary school books and those who could not read those books without risk of injury to their eyesight. These children may be grouped in the three categories: "(a) those who, having no perception of light or having extremely defective vision, cannot be taught by methods involving the use of sight; (b) those who on account of defective vision cannot follow the ordinary school curriculum, but can see well enough to be taught by special methods involving the use of sight; (c) those who are suffering from conditions such as myopia, which may be aggravated by following the ordinary school curriculum."⁸

To take care of groups (b) and (c), special classes have been established, the first being in London, in 1908. These classes were called myope classes, conservation of vision classes, and, finally, sight-saving classes, which name has much in its favour, though it may somewhat prematurely take for granted that the

aims for which the classes were organized have been attained. The first Canadian Sight-Saving Class was opened in Toronto in 1920, where now five classes are located. The objects they have in view are: (1) to preserve eyesight by preventing further increase in myopia, and, (2) to meet the need of children who cannot see sufficiently well to benefit from education in ordinary schools.

We can say quite definitely that the minimum visual standard for admission to the sight-saving class is 6/60 Snellen, except in such cases as interstitial keratitis where there is every likelihood of the vision improving, or in cases where operative treatment, if carried out successfully, will improve vision.

Experience shows that examination by a psychiatrist is necessary, as children with an intelligence quotient below 70 will be better placed in an industrial class, thus complying with the general practice to place children in special classes according to their greatest handicap. The degree of visual acuity beyond which admission to the class is inadvisable or unnecessary is not so easily located for reasons which will be apparent when we consider the ocular conditions to be dealt with. I have reviewed my records of 182 pupils and ex-pupils of the sight-saving classes in Toronto, and the following is a summary of the ophthalmic conditions from which they suffered:

Myopia, 31 per cent	56
Damage due to inflammation, 22 per cent	
Corneal opacities	21
Partial optic atrophy	10
Choroiditis	8
Iridocyclitis	1
Retrolbulbar neuritis	1
Congenital defects, 47 per cent	
Cataract	6
Aphakia	20
Nystagmus	32
Hyperopia and astigmatism	12
Coloboma of choroid	4
Buphthalmos	4
Albinism	4
Retinitis pigmentosa	3

Mr. N. Bishop Harman⁹ examined the records of a large number of children who had been in the classes and found the following quite different percentages:

	Percentage
Myopia	62.62
Damages due to inflammation	30.35
Congenital defects	7.03

These children who have damaged eyes and congenital defects with poor vision are mostly static cases, and frequently are the result of

inflammation of the cornea or choroid and congenital cataract. Some children with high hyperopia, especially if the wearing of glasses has been delayed, or if much astigmatism is present, may be backward in school, particularly on account of difficulty in seeing near objects. Such children require encouragement to use their eyes and to interpret the new retinal images, and often after a period of one or two years in the special class, their vision will improve and they can be returned to the ordinary schools. For all these children their selection for sight-saving is decided almost entirely by their visual acuity, and as a general rule those with vision of 6/60 and up to and including 6/24 should be admitted. Children with interstitial keratitis should be admitted when the subacute condition has subsided, and kept there until visual acuity has improved enough for ordinary school work. In phlyctenular disease the choice is between the sight-saving class and the open-air school, usually the latter, for periods at least, as the general condition should have prior claim. Cases of optic atrophy and retinitis pigmentosa, if the progress is slow and it seems probable that they will have useful vision for a time after leaving school, should be sent to sight-saving class, but careful records of these cases should be kept.⁸

Visual acuity as a standard for admission is relatively of less importance in myopes than in others, as most myopes see quite well with proper glasses. They should all read Jeager I if they hold the book close enough to the eye, unless macular change or considerable astigmatism be present. This, of course, is an indication for admission to the class. Even up to the present time we have little sure information to assist in differentiating the relatively safe from the dangerous forms of myopia. We know that myopia is rarely present at birth, usually beginning about or before the eighth or tenth year, and that there is a distinct rise in the number of cases at adolescence.

Increase in myopia may be arrested if all close work be stopped, though cases are on record where considerable increase has occurred in eyes which have had no reading sight for years. One school of thought holds that, on account of the inevitable danger to the eyesight of myopic children which the constant use of books entails, all use of printed matter

in any size type should be prohibited. Others, while acknowledging that reading and writing on paper are bad from the ophthalmological point of view, believe they are educationally necessary, and that in actual practice there must be a compromise in which as much good as possible is gained with the minimum damage. With the cumulative evidence at hand that myopia is often started and aggravated by too much close work, we are fully justified in checking these habits in susceptible adolescents and in diverting their attention to ways of life which will spare their eyes.⁹

The amount of myopia present is not always the deciding factor, as a child of 6 or 7 years of age with 4 D. showing moderate increase may be in more danger than one of 10 years with 8 D. Heredity is a factor which should be considered. All myopias are progressive at one time of their course, but those showing increase of 1 D. per year are better in the special class. Eyes showing a crescent with an ill-defined or irregular margin, or white or pigmented spots in the macular area, or vitreous opacities, are obviously progressive cases and should be admitted.

These children must be transferred back to ordinary school when there is no further need of sight-saving class methods. Hyperopes usually improve to 6/12 or better in a year or two and can move back. In cases of ocular disease such as interstitial keratitis an improvement in vision to 6/18 or better warrants a trial at the ordinary school. A certain number of cases, mainly those with optic atrophy, retinitis pigmentosa, relapsing keratitis, and congenital cataract, will have to be sent on to the School for the Blind. Myopes when progress does not exceed 0.50 D. per annum over a period of two or three years, if no pathological change is present, may be sent back.

It is important that ophthalmic supervision should be continued after these partially sighted children leave the school, and in those cases where the services of a private oculist cannot be paid for we have attempted to provide this service in Toronto by having the pupils who are usually 15 or 16 years of age register at the eye clinic of the General Hospital, and they are encouraged to attend there once or twice a year.

In the myope group of 56 cases in the Toronto Sight-Saving Classes from 2 to 8 years the average increase in myopia per year was 0.21 dioptres. The greatest increase was 5 dioptres over a period of 8 years, and this pupil had 3 dioptres of astigmatism in addition to the myopia. The next greatest increase was from 4 to 8 dioptres in eight years, and this pupil had no astigmatism. Thirteen had no increase in myopia over a period of three years, and of these 8 had myopia with astigmatism. The average intelligence quotient as recorded by the psychiatrist of the department was 95 for the myopes and 92 for the others.

TABLE
SIGHT-SAVING CLASSES IN CANADA

	No. of classes	No. of pupils
Maritime Provinces—		
Halifax School for the Blind		85
Quebec	1	15
Ontario	8	125
Ontario sight-saving units		156
Manitoba	2	34
Alberta	2	27
British Columbia	2	29

There are now in Canada sixteen sight-saving classes, 8 of which are in Ontario, and the total number of pupils in attendance is 315. As might be expected, these children are situated in the larger centres, as only about one pupil in one thousand requires this service. In less thickly settled parts of the country, children were found who were endangering their sight, and for these children in Ontario the office of the Inspector of Auxiliary Classes will furnish, free of charge, to the school attended by the pupil, exercises in reading, spelling, geography, history, and other subjects according to the requirements of the grade, as stated in the application form.¹⁰ These materials with suitable instructions to the teacher are sent out under the name of Sight-saving Units, and there are now in use 156 of these units. Thus in Canada there are in all 471 children being taught by sight-saving class methods, and, undoubtedly, a survey of the total school population would discover many more requiring this service.

The misfortune of the partially blind, as most of these children are, is that, although they are often as much handicapped as those who are blind, they do not call forth the same pity and generosity, for from the average per-

son's point of view, an individual is either blind or normally sighted.

Can reliable vocational guidance be given a partially-sighted child after a study of particular occupations with a view to deciding whether he is likely to succeed in them? Some of the most handicapped of these partially-sighted children have a very narrow range of trades for which they could be trained, and only a few could be taken care of in the workshops for the blind, and these not as blind persons but as ordinary employees, using such sight as they possess. Outdoor work is the most suitable, especially if it involves little close eye work; and some are able to carry on in some branch of salesmanship, farming, domestic service, or massage. The teachers can be of help by talking to the children about the types of occupation carried on locally.

In Ontario alone, in the sight-saving classes and using sight-saving units, there are 281

partially-sighted children, while at the School for the Blind there are 70 pupils. For the much larger group practically nothing is being done to provide vocational guidance and assistance in obtaining suitable employment by which they can hope to become self-supporting.

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CARCINOMA OF THE BREAST*

By J. G. MACDOUGALL

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FORTY per cent of all cancers occur in the breast, and they are second in frequency only to cancer of the uterus. The location of the breast on the surface of the body affords the best possibility for the early recognition of a lesion within it, both by the patient and physician; and likewise affords unexcelled conditions for examination and accurate diagnosis.

Notwithstanding the immediate accessibility of the breast, together with the widespread knowledge of the nature and early manifestations of this disease plus the importance of early recognition and effective treatment, a preponderating number of cases come to the surgeon when the disease has broken through its original bounds, and invaded outlying parts more or less extensively, the result being that the reasonable hope of cure that existed in the early stage has now greatly diminished or vanished. This is a distressing picture. Can we do something to prevent the disaster and at the same time promote what makes for cure?

This paper is limited to the consideration of

two groups, in which radical surgical operation, done for curative purposes only, offers us reasonable hope for cure and, indeed, is our main hope. The first group comprises the cases with the disease confined to the breast. In the second group are those in which both the breast and axillary nodes are involved.

In the first group lie the great possibilities of cure; in the second group cure is still possible, but the probabilities are very greatly reduced and indicate that a limit has been reached beyond which, with few exceptions, cure cannot be expected. In this connection it should be noted that a cross section of the end-results of radical surgical operation alone, in good clinics in America, shows that in cases where at operation the disease was found confined to the breast, 65 to 70 per cent of the patients were alive and well at the end of five years; and that in the cases with the breast and axillary nodes involved only 15 to 20 per cent showed no recurrence at the end of the five-year period. Note the striking contrast in the results revealed by these percentages. The reports from large and reliable individual

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clinics show a remarkable uniformity of end-results.

It appears also that in these two groups the results of operation, combined with pre- or post-operative radiation are no better than by radical operation alone, done by skilled surgeons. The end-results of radical surgical operation alone, or combined with post-operative radiation in both groups, indicate that the ratio of five-year cures, as between the two groups, is as five or six to one in favour of the first group. This indicates that the limit of surgery, in a curative sense, with few exceptions, is now reached. These facts, representing the work and study of highly trained and experienced surgeons in good clinics, have especially important significance and imply a challenge which can and should be sensed by every medical man.

The opinion is sometimes expressed that we cannot hope for improvement in our present end-results unless and until some more effective form of treatment is discovered. In this I cannot concur, until it is shown that our present resources, professional and lay, are being utilized to the degree and in the manner possible. It is perfectly clear that the educational campaign which has been in progress for several years must be continued with increasing intensity by as many agencies as possible. There are definite indications, here and there, that it is slowly bringing results.

Fear of being told that the painless little lump in the breast is cancer and the dread of operation prevent many women from seeking timely advice and aid; while many others do not sense the need of advice, because the lump does not cause pain. Tactful presentation of a few simple truths along preventive lines, with due regard for human psychology, will achieve much in overcoming the fear, the prejudice and ignorance of people that rob them of the chance of cure. Every medical man, be he general practitioner or specialist, can do much to mould the public mind to respond rationally to this vitally important matter.

We now turn to the patient who has heard and regarded the voice of wisdom. She comes because of some vague sensations in or about the breast, and indicates her fear of neglecting what may be warnings of cancer. She has no pain and has not "found a lump", but is obviously nervous and worried. She has taken us at our word and has come early. Here we must

realize the seriousness of our responsibility, for the burden of making a vitally important decision is mine or your's as the case may be. A cursory examination, reassuring words, and a reminder that she is "unnecessarily worried about herself", or is "becoming introspective", may cause a false sense of security and fatal delay. This is not based on a hypothetical case. Our duty is plain. A painstaking physical examination of the breasts should be made, to determine if a lump or other abnormal feature is present. Now, such examination implies the employment of reliable methods, for otherwise serious error may easily result in either failing to find the lump, which may be there, or diagnosing a "lump" where none exists. In the former case the assurance that there is no lump or other sign may give a sense of security resulting in delay, whereby the day of physical salvation is allowed to pass. It has been the distressing experience of every surgeon to listen to the story, see the tragic results of delay, and contemplate with a feeling of disappointment and sorrow how and why the opportunity for cure was lost. The fact that in exceptional instances there is admittedly great difficulty in detecting the presence of a lump does not entirely excuse one from not finding it under the circumstances. Expert opinion should be sought. The deadly cancer cell is constantly reproducing recruits for its standing army, *i.e.*, the localized lump. These are constantly infiltrating the surrounding tissue, preliminary to the inevitable invasion of outlying territory, along the lymphatic roads of travel, by transportation and permeation.

The patient should be stripped to the waist, placed in a good light, and examined in the sitting or standing position, and then in the recumbent. Inspection should include comparison of the two breasts as to size, shape, and the relative levels on the chest wall; the nipples, for retraction and signs of discharge; the areolæ, for signs of eczema or irregularity of outline; and the skin for the presence of even slight dimpling or tiny areas of slight local skin flattening, where on picking up a small portion of this skin between the finger and thumb it reveals attachment to the deeper tissues. The presence of a lump may be suggested by slight local elevation, noticeable only when viewed from a particular angle. Palpation should be done

systematically, including every part of the breast. Do not omit the axillary tail of the gland pointing upward and outward toward the axilla. The hand should be placed flat on the breast, and palpation lightly and inquiringly done with the sensitive pads of the fingers along radiating lines from the periphery of the breast to the nipple. The palm of the hand pressed on the breast "irons out" the normal nodular feel that may mislead one when palpating across the ducts, or grasping a portion of the gland between fingers and thumb. Examination of the axilla should be made, keeping in mind the location of pectoral and axillary glands. This also applies to the supra-clavicular area.

The next type of the early arriving case is the woman who *has* found a lump in her breast and at once seeks medical advice. She, as in the former case, is acting on the advice: "Come early, for in that lies the hope of cure". She has discovered the lump accidentally. It is neither painful nor tender, and has given no warning of its presence. Here it is helpful to keep in mind that about 75 per cent of all breast tumours are malignant, and therefore the chances in this case are greatly in favour of its being malignant. Do not be misled by the apparent innocence of the lump or the fact that the patient is young. The textbook description and illustrations for practical purposes in this case are of no assistance, for they, in the main, relate to a later period of the disease, when it has produced gross structural changes in the breast, skin and glands, and the diagnosis of cancer is clinically obvious. To give the reassuring advice that the lump "is a thickened duct"; "a little gland"; "a fibrous tumour" or "don't bother it until it bothers you", is highly dangerous for the patient. It is what she hopes to hear, and she is but too ready to act on this advice. A reliable diagnosis must be sought at once. The patient should never be advised "to keep the lump under observation", and to report periodically for examination; nothing helpful can be gained from such a practice, and the hazard to the patient is great. The rubbing of the breast with liniments, and palpation of it daily or more frequently by the patient, should be mentioned only to be condemned. It is an effective method of disseminating cancer cells. Such practice is not only folly—it borders on malpractice in the light of our present knowledge and standards. Early or late, the day of lamentation and recrimination will

arrive, when it is found that the time for a possible cure has almost or wholly passed. This is a picture of reality, not fancy.

In all early cases the difficulty of differential diagnosis by clinical methods is always present. A good history is a most important part of our investigation. To watch and wait until these signs appear, and a diagnosis of cancer is obvious, means that the patient's chance for cure is largely, if not altogether, gone. Instead of attempting a clinical diagnosis, assume that every lump is malignant until proved otherwise; for we may as well realize the fact now that by clinical methods alone, with few exceptions, a lump in the breast cannot be positively diagnosed as cancerous or not cancerous. The clinician can neither see nor feel the cancer cells that lie within the apparently simple lump. The lump must be removed or explored and subjected to tests that reveal its true nature. If it is cancer, the diagnosis is thus made at the time when surgery offers the best hope for cure. It follows logically that the radical surgical operation should be undertaken promptly, and this should be done only by those of adequate surgical training, skill, and good judgment, nurtured by knowledge and experience. This is not idealistic, for at present it may be said that at no time has there been such an adequately large number of well trained surgeons readily available to give this service to all classes and conditions of people, according to the best standards of modern surgical practice.

The factors that are essential to obtain the cure that is possible from radical operation are many, and must be utilized intelligently to the full limit of our resources. This is the patient's best resort and may be her only chance for cure. She is entitled to the best that can be given her *now*, for secondary operations generally yield unsatisfactory results and are often palliative only.

The operation is planned or varied according to the conditions or needs of the individual case as determined by the surgeon, but must be carried out to the extent of completely removing the disease. I doubt if any operation in general surgery is of such vital importance, all things considered. The choice of procedure and method of approach may be such as to tax the resources of the most experienced surgeon. I need not remind you of the disaster that may and unfortunately does follow the local removal of the growth on the assumption that it is not malig-

nant, and without seeking proof to the contrary; or the removal of the breast alone, under conditions that require more radical measures; or an operation intended to be radical, but because of timidity, lack of experience, or other cause, is wanting in some of the outstanding essentials of sound surgical practice and is therefore incomplete.

These and similar practices not only invite but hasten disaster (which follows with unfailing certainty), and close the door against the cure that otherwise was possible. Such experiences naturally cause the surgeon to regret that the breast is so accessible, and that for other reasons it lends itself so easily to the scalpel of the inexperienced. Enlightened public opinion can do much to cool the *ardor operandi*, and instil a fitting sense of responsibility in those not surgically trained and fitted for such vitally important work.

Radical operation, when the proved facts reveal the necessity for such, must be done, but it is important that due regard be given to the avoidance of radical or other operations which are unnecessary and deforming. The judgment of the experienced surgeon and his knowledge of the gross pathological features of the lump are the great safeguard against unnecessarily extreme measures, and likewise in the exercise of them should they be required.

It is sound practice to have the patient prepared and anesthetized as for a radical operation at the time the lump (as yet not specifically diagnosed) is to be removed for examination and a decision given as to its nature. On removal of the tumour it is cut, the gross appearance studied, and the diagnosis thus made will determine at once whether a radical operation is indicated, or, on the other hand, whether the breast may be saved, and no more than the removal of the lump is needed. There are many surgeons who employ this method entirely and place more reliance on it than on the microscopic examination of the frozen section made at the time. Personally I prefer this method, in contrast to the frozen section, or the biopsy, with subsequent laboratory report. The gross section method, however, should never be employed by any one who is not thoroughly familiar with the gross pathological features which differentiate the malignant lump from the benign. He who has a sense of responsibility and is conscious of his limitations will not subject the patient to the hazards of a wrong diagnosis and the possibility of doing a limited operation where it should be radical, or, on the other hand, to the mutilation of the breast where no more than the removal of an innocent lump is necessary.

EPITHELIOMA OF THE LIP

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THE methods commonly employed in the treatment of epithelioma of the lip are fairly well standardized, as to the treatment of the lip itself, it being generally recognized that x-ray, radium, or surgery will give equally satisfactory results. But there is considerable divergence of opinion in the matter of treatment of the tributary gland areas. The scale has swung from one extreme to the other; from surgical extirpation of the entire gland area, whether glands are present or not, from the use of massive doses of x-ray, or the radium bomb, down to the leaving of the gland area severely alone.

For the purpose of contributing a small quota to the statistical solution of these problems, the writer has carefully analyzed a group of cases of epitheliomata of the lip, which has been

treated at the Bigelow Clinic. This is a group of consecutive, unselected cases of patients. They include all cases treated during a given period, embracing all stages and grades of cancer, including the inoperable, and those with broken-down cervical glands. To these a call-in report was sent in order to appraise the results of treatment.

Ninety of these patients received the following questionnaire. In (year of treatment) we treated an ulcer on your lip. (1) Has it remained cured? (2) Were there any complications?

Seventy replies were received from these patients, their local doctors, or their relatives. The purpose of this paper is to analyze these replies and to note the results achieved by the

varied types of treatment given, varied, not in general principle, but according to the particular type and extent of the disease in the individual case.

In uncomplicated epithelioma of the lip of fairly recent origin, and not more than 1 cm. in diameter, the treatment employed by the writer has usually been unfiltered x-ray to the lesion, and 5 mm. beyond. In certain cases, where the circumstances of the patient required limitation of the time of treatment, the radium, or surgical, method was employed.

In cases where the lesion was greater than one cm. in diameter, or where it had been present for a long time, or where there were palpable tributary glands, the lip and glands were subjected to a course of x-ray or radium treatments. Subsequently, if the lip lesion had not healed, which occurred very rarely, the epithelioma was resected. The x-ray or radium treatments were continued over the gland areas, with subsequent resection of these areas a very rare necessity.

RESULTS OF TREATMENT

Seventy patients reported the results of treatment. Sixty had remained alive and healed, after a period varying from one to fifteen years—an average of 86 per cent. Twenty-three had remained healed from one to five years, 20 beyond the five-year period, 8 beyond the ten-year period, and 9 beyond the fifteen-year period. Of the 10 cases which had died of epithelioma of the lip or its complications, the average duration of life following the beginning of treatment was three years.

1. *Early cases.*—The simplest type of case, where the lesion was not more than one cm. in diameter; and the period of duration of symptoms had been less than one year, and there were no palpable glands, constituted 34 of the group of 70 which reported.

The results of treatment in this group were as follows:

X-ray treatment to lip alone	27 cases; cured	27 cases
X-ray and radium	3 “ “	3 “
Radium	2 “ “	2 “
Surgery	2 “ “	2 “
Total	34 “ “	34 “

One hundred per cent of cures in this type will be regarded as sufficient evidence of the efficiency of the treatment.

2. *Advanced cases.*—When the lesion has progressed beyond the confines of these early limits,

the problem becomes entirely different. When the epithelioma is larger than 1 cm. in diameter, or has lasted more than a year, whether glands are palpable or not, the methods of treatment must be greatly amplified. In this type of case the lip lesion was treated by x-ray or radium, or surgery, or some combination of these. The gland areas were treated intensively with x-ray or radium, or both. After this intensive treatment the gland area was widely excised in only five of the cases, of whom four subsequently died. In this advanced type of epithelioma of the lip belong the remaining 36 cases of this series.

The detailed methods of treatment used, and the results obtained were as follows.

(a) Where palpable glands were not present:

X-ray treatment alone to lip and gland area	7 cases; cured	6 cases
X-ray and radium to lip and gland area	1 “ “	1 “
Surgery; preceded and followed by x-ray treatment in the lip and gland area	13 “ “	10 “
Surgery, x-ray and radium, lip and gland area	3 “ “	2 “
Total	24 “ “	19 “

(b) Where palpable glands were present:

Turning to the cases in which palpable glands were present when the patient first presented for treatment, the methods employed and the results, were as follows:

X-ray treatment to lip and gland area	5 cases; cured	3
X-ray and radium	1 “ “	1
X-ray and surgery	3 “ “	1
X-ray, radium and surgery, lip and gland area	3 “ “	2
Total	12 “ “	7

It is evident, from a study of these tables, that the most hopeful type of case is the early uncomplicated one where, in this series, the percentage of cure was 100. The least hopeful type of case is that in which there are palpable glands at the time when the patient presents for treatment. The percentage of cures in this class of case is 58. Between these two groups of most hopeful and least hopeful cases stands that group in which the lesion is advanced, but there are no palpable glands. The percentage of cures in this group is 80. The average of cures for the entire series is 86 per cent.

CONCLUSION

1. The early uncomplicated cancer of the lip is curable in 100 per cent of the cases by x-ray, radium or surgery, to the lesion alone.

2. Cancer of the lip does not tend to metastasize early, and if discovered early does not usually require any treatment of the gland area.

3. In cases which show high degrees of malignancy as evidenced by pathological grading of malignancy, or the rapid growth, longer duration, or gland involvement, the lip should be treated by x-ray or radium, or surgery preceded

by x-ray or radium. The gland area should be treated by intensive x-ray or radium, over an extended period of time, with occasional excision.

4. The necessity for routine wide excision of gland areas in all cases of epithelioma of the lip is not borne out by the results obtained in this series.

FASCIOTOMY FOR CHRONIC SCIATICA AND BACKACHE: AN ANALYSIS OF END-RESULTS

By J. A. NUTTER

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A STUDY of the operative treatment of backache and sciatica was begun three years ago. It was established that relief of tension in the buttock muscles and fasciæ had a favourable effect on sciatic pain.¹ During this time fasciotomy, or section of the iliotibial band of the fascia lata (Ober²), was practised extensively in various cities for the relief of sciatica and backache. From the Orthopædic Departments of the Montreal General Hospital and the Woman's General Hospital 45 cases have been investigated as regards end-results, which are now given. No case is included that is less than three months after operation. Seven patients with double sciatica and double operation are tabulated as fourteen cases. One case of double backache, relieved by operations at ten months' interval, is counted as two cases.

	No.	Percentage
35 cases of sciatica with backache:		
Sciatica: Relieved of pain	24	69
Improved	1	3
Not improved	10	29
Backache: Relieved of pain	13	46
Improved	2	8
Not improved	13	46
Both sciatica and backache relieved:	14	40
3 cases of sciatica alone:		
Relieved of pain	2	67
Not improved	1	33
7 cases of lumbo-sacral backache alone:		
Relieved of pain	3	43
Not improved	4	57

It will be seen that fasciotomy has been successful in 69 per cent of sciaticas with backache (selected cases, usually of months' or years' duration); the backache was relieved in 46 per cent. There were a few patients having sciatica without backache, which is uncommon; 67 per cent of these were relieved of pain. In backaches unaccompanied by sciatica the re-

sults are only fair (43 per cent), and the operation is more likely to fail than to succeed. Twenty-four per cent of the patients were relieved of backache and/or sciatica on one side by an operation on that side, but experienced a return of the pain on the side not operated on, usually after a few weeks. As a rule the sciatica or backache, once it had disappeared, did not return. One neurotic woman (a double case) had a recurrence. No other instances of this have been found.

The fascia lata, or deep fascia of the thigh, extends from the iliac crest above the whole surface of the buttock and outside of the thigh, descending to its insertion into the outer side of the head and of the tibia just below the knee joint. Its function is to keep taut all the outer structures of the thigh. It is really the insertion of the tensor fasciæ femoris anteriorly and the gluteus maximus (in great part) posteriorly. Considered thus, it is an abductor of the thigh. Through the tensor fasciæ femoris anteriorly and the gluteus maximus posteriorly it can also flex or extend the thigh. It splits to enclose the anterior edge of the gluteus maximus, and at times is unusually thick and dense here. The ilio-tibial band is a particularly thickened and tight portion of this fascia lata, normally to be found just in front of the great trochanter. It is an inch or two wide. A normal person should be able to adduct the thigh to the median line with the thigh fully extended and the knee flexed, the subject lying on his side. A tight iliotibial band will not permit such adduction, even under an anæsthetic. In acutely painful cases limited adduction may be due only to muscle spasm, disappearing

under an anæsthetic. In either case section of the fascia lata may give relief of sciatic pain, due to sudden loss of muscular spasm.

These variations in tightness and thickness of the fascia lata may be due to the demands of posture. One person may need an extra strong pull downwards anteriorly to maintain equilibrium, and so have well developed fascia lata in the region of the anterior superior spine. A stout person, on the other hand, with a heavy abdomen pulling him down in front, may need an extra strong pull posteriorly to keep him erect. An accident, an attack of lumbosacral arthritis, or fatigue, etc., may cause backache or sciatica with resulting muscular spasm. As a result postural changes occur. We may find lumbar scoliosis, loss of lordosis, limited adduction of the thigh, or straight leg-raising limited by pain. A vicious circle has resulted, the pain causing the spasm and the spasm perpetuating the pain. The vicious circle is destroyed by cutting the tight fascia lata, thus removing the spasm in the buttock muscles, with the underlying sciatic nerve emerging from the pelvis. The fascia lata is cut from below the anterior superior spine backwards to where it splits to enclose the gluteus maximus (6 to 7 inches). Care must be taken to search for and to cut the fascia both front and back and not to be content to sever the ilio-tibial band alone. The cut fascia lata retracts about $\frac{3}{4}$ inch, the gap gradually filling in with fibrous tissue. No permanent weakness has been met with as a result of the operation.

The patients as a rule experience, either at once or gradually within a couple of weeks, an increased range of painless motion in the leg operated on. Ankle movements, once agonizing, are now painless. A knee that for months needed pillow support can now be fully extended in the bed. What has happened? How does the relief come about? Undoubtedly muscular relaxation has been obtained; undoubtedly posture has been changed by the operation. Was a lumbo-sacral or sacro-iliac articulation, held by muscular spasm in a position of strain, eased by the fasciotomy? Was a joint the seat of the pain? This has been held for many years. We have long considered backache to be due in many cases to lumbo-sacral or sacro-iliac strain and the sciatica to nerve-root pressure in the intervertebral for-

men. On the other hand, increased attention is now being paid to myofascitis as the source of the pain, with the sciatica secondary to this. The rôle of the soft parts is being studied with greater care. Steindler³ in an excellent article, gives reason for believing sciatica to be, at least in some cases, a referred pain. His article is illuminating and well worth study. In support of his view, that the source of pain may not be in the joints, it may be mentioned that cases have been seen in our own clinics where a persistent backache has been relieved at once following operation for a lumbo-sacral fusion months before any fusion could possibly have taken place. The relief of pain here was evidently due to the dissection of the lumbo-sacral area, with relief of muscular and fascial tension. Just as ilio-tibial fasciotomy has replaced sacro-iliac fusion for relief of chronic sciatica so it is possible that lumbo-sacral stripping, *i.e.*, freeing the erector spinæ from the sacrum and the fourth and fifth lumbar vertebrae, may replace lumbo-sacral fusion, at least in some cases. This problem is being studied in cases of chronic backache, the results to be reported later. The substitution of a mild for a severe operation would be of great benefit.

Indications for fasciotomy.—Backache and sciatica may be largely grouped under the headings of (1) arthritic, and (2) mechanical, *i.e.*, joint strain and postural defects. The longer they last, the greater the mechanical or postural element. Arthritis may be the original source of the pain. It may, however, gradually burn itself out and leave behind scoliosis, too hollow or too flat a back, a strained or damaged lumbo-sacral articulation. In many cases x-ray reveals nothing definite. There may be, and very frequently are, asymmetries and other malformations of the lumbo-sacral articulation. Whether they are the cause of the pain is doubtful; they probably are in a few cases.

Fasciotomy (a mild operation) is indicated in cases of sciatica and of backache-sciatica of mechanical but not of arthritic origin. Note that lipping of the lumbar spine, so often seen in x-rays, does not prove arthritic activity. In a heavy patient it may relieve pain on one side and be followed later by pain on the side not operated on. This has been seen principally in women. It must not be assumed that contracted fasciæ are responsible for all cases of sciatic pain.

Where forward flexion is painful and associated with muscular spasm it is suggested that lumbo-sacral stripping⁴ be tried before fusion. Fusion is the last resort in cases of chronic lumbo-sacral strain.

In women gynæcological conditions naturally have to be considered.

The diagnosis of an extruded intervertebral disc depends ultimately on the injection into the lumbar sac of iodized oil and subsequent x-ray. Such a procedure is not to be lightly undertaken. Negative x-rays and negative results of spinal fluid examination, including manometric pressure, taken below the site of the pain, will

usually suffice to exclude disc cases. It has been suggested that in doubtful cases fasciotomy be tried before iodized oil is injected.

My thanks are due Drs. S. E. Goldman and J. G. Shannon, without whose assistance this study could not have been carried out.

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BURSITIS*

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MUCH has been written about bursæ and the afflictions arising in and from them; much has been written about the sub-acromial and sub-deltoid bursæ in particular. I may say that I have had a personal experience with sub-deltoid bursitis within the past eighteen months, and stimulated thus, I have undertaken this investigation with considerable fervour. I have discovered that until recently but little interest has been taken in the *development* of the bursæ, yet here lies the secret of the understanding of the lesion itself, its cause, and the hope for cure. These studies too have fairly definitely pointed out that bursæ are potential spaces developed in connective tissue. They contain a synovia-like fluid which permits movement of one tissue over another with a minimum of friction. It has been shown that some bursæ are developmental in origin and that others appear in connective tissue in response to a functional demand. Investigators at Pennsylvania University found that at birth, fulltime or premature, the sub-deltoid bursa was present in only 72.5 per cent of a large series of newborn; neither the familiar prepatellar nor the subcutaneous olecranon bursæ were found at all! Their conclusion was, then, that these latter develop after birth and as a response to movement.

So far as its anatomy is concerned, Boyd regards a bursa as simply a sac-like synovial

membrane containing fluid. Similar as it is in structure to a joint and tendon sheath, it is equally similar in the diseases to which it is liable. Many bursæ are adventitious and are developed as a result of friction. Most are closed sacs, but a few communicate with a joint cavity; that, for instance, between the gastrocnemius and the semi-membranosus is usually continuous with the knee joint.

The particular pathological condition affecting a bursa is inflammation. This may be due to trauma, or to infection, including tuberculosis.

For convenience of study, bursæ may be divided into two groups: (a) superficial, and (b) deep. The superficial bursæ are those which lie in the connective tissues between the skin and bony prominences. Those which most often produce symptoms are the olecranon, the prepatellar, and the bursa which develops over the metatarso-phalangeal articulation of the great toe, particularly in connection with the deformity known as hallux valgus. The deep bursæ are those which lie between muscles and moving bony parts. Most important is the sub-acromial or sub-deltoid, sometimes the bursæ over the greater trochanter of the femur and the tuberosity of the ischium.

DISEASES OF THE SUPERFICIAL BURSE

These are the result of friction between the skin and bony parts to which has been added trauma and, oft-times, infection. As a result definite pathological changes occur and we find

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an acute traumatic bursitis. Take, for example, the olecranon. The application of external violence results in a sliding of the skin over the triceps tendon and the olecranon process. The bursa, primarily only a potential space, fills with serous, or, if the violence has been sufficient and hæmorrhage occurs, a sero-sanguineous fluid, which becomes palpable as a well-defined fluctuant sac over the point of the elbow. Aspiration reveals the presence of serous or sero-sanguineous fluid. The fluid tends to become absorbed as the acute reaction subsides, but varying amounts of cellular elements and fibrin remain and undergo organization. This results in thickening and roughening of the bursal sac and perhaps adhesions between the apposed bursal surfaces. Persistent return of fluid into the bursal space is probably due to friction between the apposed roughened surfaces on return of motion.

The symptoms of *acute traumatic bursitis* are easily recognized. There is a history of trauma with subsequent tenderness and distension of the bursal sac. It is important in making a diagnosis to ascertain whether the lesion is an acute traumatic bursitis superimposed upon a chronic process or whether it is a primary condition, that is, trauma to an otherwise normal bursa. This is important because of the difference in prognosis and treatment. An acute traumatic lesion in a primarily normal bursa is treated like any acute traumatic lesion, namely, by immobilization of the part by means of a properly fitted splint, a firm elastic compression bandage and cold applications. These in 24 to 48 hours usually result in rapid subsidence of the condition and relief of pain. Where there is definite fluctuation aspiration relieves the tension and shortens the course. After the acute exudative phase subsides, usually in two or three days, heat in the form of diathermy or its many companion devices may be applied. Splinting follows for three or four days and then a pressure bandage such as elastoplast is applied. Care should be taken to protect the area from subsequent trauma.

Suppurative bursitis may follow a laceration or puncture of the skin overlying a bursa, or may result from the extension of a contiguous infection; as an example, furuncles over the patella. Seen early, treatment should be conservative—splinting and rest to reduce pain

and lessen tension until the inflammatory process is well localized. Incision and drainage under general or local anæsthesia is then necessary. No attempt should be made to excise an acutely inflamed bursa.

Subacute and chronic traumatic bursitis.—When the trauma is relatively mild but occurs frequently, or when the resorptive phase of an acute bursitis is repeatedly interrupted by further trauma, fibrous tissue formation is a preponderant feature. The bursal walls become much thickened, trabeculæ and villi form and increase in number and density. The villi rise as granulations on the floor of the bursa and tend to grow into the cavity of the bursa. The villi frequently have bulbous tips. Small amounts of fluid may be present, and the condition, in the advanced chronic type, forms a large rubbery mass in the subcutaneous tissues, containing hard, movable bodies. Frequently the causal factor in the development of the chronic thickening of the bursal wall is occupational, the patient's work necessitating exposure of the bursa to repeated trauma. Hence, characteristic names have been given, such as housemaid's knee (chronic prepatellar bursitis), miner's elbow (chronic olecranon bursitis), weaver's bottom.

Sometimes persons with a chronic bursitis complain of a sharp pain when slight pressure is applied over the bursa. These patients describe the sensation as of the elbow having been put down on a tack, when a hypertrophied villus or trabeculum is traumatized by leaning on a hard surface. The same complaint, and for the same reason, is made by patients with prepatellar bursitis at times on kneeling. When examined, the bursal sac can be outlined as a thickened rubbery area, containing small, hard, tender and usually movable bodies. These bodies may be so hard as to be confused with bone. This type of case usually demands surgical interference, with excision of the bursal sac.

Many cases of chronic bursitis have an acute traumatic bursitis superimposed. The bursal sac is distended and fluctuant. On palpation the indurated walls can be felt and the trabeculæ and villi can be rolled under the fingers. Aspiration usually results in a rapid and almost complete refilling of the sac in a period of from 24 to 48 hours. In the treatment of this type two methods are available. First, an

effort is made to obliterate the sac by the injection of some irritating solution after aspiration, various substances being used, such as sodium morrhuate, tincture of iodine, etc.; secondly, operation, indicated when sclerosing agents fail, that is, the excision of the sac in its entirety. Excision of the sac in hallux valgus is the exception and is of no value unless the deformity of the bone is corrected.

DISEASES OF THE DEEP BURSÆ

The deep bursæ are those which lie between muscular attachments and moving bony projections. The deep bursæ are numerous, such as (a) the subcutaneous gluteal, (b) ilio-psoas, (c) supra-trochanteric, (d) semi-membranosus, and (e), by far the most important and most frequently involved, the sub-acromial or sub-deltoid, lying between the coraco-acromial arch and the deltoid muscles above and the short rotators of the humerus and the greater tuberosity below. In this paper we shall refer particularly to this bursa, for reasons I mentioned at the beginning. A good example is the following case.

LaS., aged 25 years, was admitted to hospital on April 23, 1938, complaining of severe pain about the left shoulder joint and painful movements.

History of present illness.—On April 12th, eleven days before his admission to hospital, this man, who belonged to the militia, was detailed on ammunition fatigue, which consisted in moving twenty-seven tons of ammunition in eighty-five pounds lots. While at this work, soreness of the shoulder was first noticed, which gradually became worse from day to day until at the time of admission to hospital the pain was excruciating and the arm useless. Examination of the affected part revealed extreme pain on attempts to move the shoulder in any direction. The pain was most severe on attempts at abduction. The arm was held tightly against the body and flexed at a right angle at the elbow joint. Tenderness on palpation was excruciating and most severe just below the top of the acromion anteriorly.

Treatment.—Shortly after admission several punctures of the bursa were made with a No. 18 calibre needle which gave him marked relief. An x-ray report on that date states, "There is evidence of a small flat calcified area in the soft tissues over the greater tuberosity. This is either a calcified bursitis or a ligamentous tear, probably the former." On April 28th two No. 18 gauge needles were placed in the sub-acromial bursa, and a considerable quantity of white, flaky material was withdrawn with blood-stained fluid. The sac was irrigated with 1 per cent novocaine which was followed by immediate and dramatic relief of pain.

This case is a good example of the so-called acute traumatic sub-deltoid bursitis with early calcification. It will be noted, first, that this man was subjected to unusual work, and of a type involving severe usage of ordinary muscles. It will also be noted that the history of the case dates from the day on which his muscles were subjected to this work, and that

thereafter the pain gradually developed until it became excruciating in character, which story is characteristic of the type of case known as acute traumatic sub-deltoid bursitis. Most observers are of the opinion that the cause of the excruciating pain is tension of the capsule, and unquestionably relief is obtained in a large percentage of cases of this acute type when the bursal sac is perforated at a number of points and, if necessary, a solution of novocaine, 1 per cent, slowly injected.

In an article by Delprat, of St. Luke's Hospital, San Francisco, 1936, he says that needling the bursa relieves the symptoms, whether you are able to withdraw fluid or not, and that it has become a routine procedure at his clinic. He further states that, probably, the effect of the needle point is to cause laceration of the sac wall with tearing of the same and escape of fluid into the surrounding tissues, resulting in relief of tension.

Ferguson, of Philadelphia, in the *Annals of Surgery*, February, 1937, classified lesions of the sub-acromial bursa and supra-spinatus tendon as follows: (1) acute traumatic sub-deltoid bursitis; (2) acute sub-deltoid bursitis with calcification; (3) sub-acute bursitis with calcification; (4) chronic bursitis; and (5) tendinitis or obliterative bursitis. Codman, of Boston, who has probably done more than any other in this particular condition, says that the disease may be divided arbitrarily into three stages: (1) acute or spastic; (2) sub-acute or adherent; and (3) chronic. In the opinion of many observers there is no sharp line of demarcation between the subacute and chronic stages. The two seem to merge into one another. Lattman, of Washington, says: "If the patient has had an acute attack which has subsided and another attack or recurrence with the same symptoms on the same side, occurring within a short period, say, from two to four weeks, this second attack may be called 'sub-acute', for while it gives all the symptoms of an acute stage, they are not usually as severe."

According to Codman's conception of the pathological condition, it is during this stage that adhesions form in the bursa between the roof and the floor. There is, however, no unanimity of opinion on the pathology of this disease. Many authorities believe the bursa does not even enter into the reaction, but rather that the disease is due to a lesion in the

supra-spinatus tendon and not in the bursa proper.

Symptoms.—The symptoms of acute bursitis vary with different patients. Whether calcareous deposits are present or not, the clinical picture is much the same. In the main, we may say that the chief symptoms are, (1) Severe pain in the shoulder joint of varying degrees of severity, radiating to the neck, arm, forearm, and even to the finger tips. The pain suggests brachial plexus distribution, is usually accentuated at night, and may even cause nausea. (2) Limitation of movement in varying degrees: Posterior movement and abduction of the arm are markedly restrained, and there is usually a point of exquisite tenderness in the region of the greater tuberosity of the humerus, which may promote pain downwards to the finger tips or upwards to the edge of the acromion process. The chronic stages give much the same symptoms as the acute and sub-acute stages, but they are much milder and respond much less favourably to any form of treatment. Also, they are usually of much longer duration. The sub-acute and chronic types may occur as such without a primary acute attack. In these the arm can be abducted to a certain degree, to about where the arm forms a right angle with the body. It is at this point that the patient usually experiences the most severe pain. After that point is passed the arm can be abducted, rotated backwards, and often raised, without such acute distress. The greatest degree of pain is again experienced descending, when the arm is at a position at right angles to the body. This point of acute pain is probably due to the fact that at this angle the bursa, being thickened, is pinched between the greater tuberosity of the humerus and the acromion process of the scapula.

Differential diagnosis.—Sub-acute bursitis is the most common ailment of the shoulder, but it must be differentiated from several other diseases. If there is a history of trauma, it must be differentiated from fracture or dislocation, which can be done by careful history, physical examination and roentgenography. It must be differentiated from tuberculosis, lues, cystic bone lesion, giant cell tumour, osteomyelitis and a malignant tumour. This, also can be done by careful history, physical examination and roentgenography.

Treatment.—Almost every form of treatment has been used with more or less success. The truth is that rest and mere abduction of the arm in a splint, or with a pad in axilla, the arm being held firmly to the side, and some of the analgesics, if necessary to carry the patient over the acute stage, will bring about a cure in a large number of cases, in six to eight weeks and in some cases a much shorter time. A very small percentage go into the sub-acute or chronic stage when the symptoms may subside and occur over and over again. Most surgeons and orthopædists agree that the type of bursitis characterized by the absence of calcification requires no operation. In this, however, Codman does not agree, in that he believes operation should be performed in order to break up adhesions. Operation should only be resorted to in cases where the various forms of treatment have been tried for a period of months and have failed, particularly where pain and limitation of movement persist and the patient is incapacitated. Physiotherapy has long been used in many forms, including diathermy, galvanic currents, sinusoidal current, ionization, and all forms of massage and active and passive motion. It is freely admitted by all that there is no specific form of treatment. In the acute stage, or in that type known as the acute spastic or acute traumatic bursitis, needling of the bursa will give in a majority of cases instant relief; a 16 or 18 calibre needle loaded with 1 per cent novocaine inserted into the bursa at various points gives almost immediate relief, as in the case cited. Irrigation of the joint has been recommended, and in the case to which I referred, irrigation was carried out with the marked success.

The technique of irrigation of the bursa is simple. The equipment consists of two 18-gauge steel needles, 2½ inches long, one 20 cm. syringe, 60 cm. of 1 per cent novocaine, a hypodermic needle, one No. 10 Bard-Parker blade, and as much saline as is thought necessary. With the patient lying on his back the affected shoulder is prepared with iodine and alcohol. A small wheal is made in the skin over the point of maximum tenderness. This point usually corresponds to a spot about one inch lateral to and on the same horizontal line with the coracoid process of the scapula. Then, with the point of the scalpel the skin is nicked through the epidermis. In like manner a

second point is infiltrated just about $\frac{1}{4}$ inch posterior to the greater tuberosity of the humerus on a level with the superior facet. Following the injection of the novocaine one of the large needles is introduced through the skin in the region of the anterior portion of the anesthetized area. After it has reached a depth of one-half to three-quarters of an inch the wall of the bursa can be felt as a definite resistance. The second needle is inserted into the region just posterior to the greater tuberosity. Novocaine is injected and the irrigation carried out without trouble.

Among the latest forms of treatment, roentgen rays have been employed, and in an article by Lattman, of Washington, he says, that in a series of twenty cases the results justify the belief that it relieves pain and restores function more rapidly than any other form of treatment. He says: "We have treated many other cases with good results, but only in the twenty reported here have we been able to follow up the patients for a period ranging from one to five years."

In the after-treatment of chronic bursitis, or in that type which Ferguson speaks of as tendonitis or obliterative bursitis, great stress is laid upon the necessity of carrying out certain exercises. This type of case is among the most difficult of all to treat. The arms here are practically useless, especially if their occupation demands abduction. The treatment should consist in stretching or rupture of the adhesions, so that the gliding function of the sub-deltoid bursa may be resumed. Conservative treatment, diathermy, with exercise within pain limits are all indicated. A second method which has proved successful in a majority of patients has been the injection of 20 to 30 cc. of a 1 per cent novocaine solution into the region of the deltoid bursa. The injection has

a two-fold purpose, to stretch and dilate the tissues in the region of the bursa and thus provide for some gliding movement, and, being anesthetic, to produce more or less relief of painful stimuli through this area and so permit manipulation of gradually increasing range. Various exercises, as the swinging of some heavy object such as a dumbbell or an old-fashioned flat-iron have been advised. Another exercise is the so-called "wall climbing", in which the patient creeps up the wall with his fingers. Another exercise is where the patient grasps a bannister or table or some other object about waist-high. He then backs away from the object with the hands in place.

In conclusion, let me state that the constancy with which a story of trauma appears in the history of patients with bursitis, and particularly with painful lesions of the shoulder, points to the importance of injury as the outstanding etiological factor.

The question of focal infection and toxic absorption from teeth, tonsils, and even colon, in chronic bursitis and tendonitis has been carefully investigated by Ferguson, and he states in those cases where foci of infection were found no special benefit seemed to follow eradication. Diagnosis is, as a rule, not difficult, a careful physical examination, supplemented by roentgenograms taken at various angles, usually suffices.

As to treatment. In the acute type perforation of the bursa to relieve tension, to be followed by irrigation as described, has been shown in a large number of cases to markedly diminish the average period of economic disability, and is particularly indicated in this type. Irrigation is not indicated in cases where the roentgenograms show old calcification, probably in the supra-spinatus tendon.

HAYDN'S POLYPUS.—Delivering the Hunterian Oration in memory of John Hunter, the famous eighteenth-century surgeon Mr. W. Sampson Handley referred to the composer Haydn as being among the "lions" of Mrs. Hunter's salon. Mrs. Hunter supplied Haydn with the words of his "Englische Original-Canzonetten", a book of 12 songs, and also wrote the libretto of Haydn's *Creation*. Haydn referred in 1792 to John Hunter as "the greatest and most celebrated surgeon in London", but his last visit to Leicester Square was not too pleasant. John Hunter had frequently pressed him to consent to the removal of a nasal polypus which

troubled him, but Haydn postponed the appointment from week to week. Learning of Haydn's imminent departure from London, Hunter invited him to come to Leicester Square for urgent but unspecified reasons. "After the first compliments" (Haydn recorded) "several stout fellows entered, seized me and would have put me on a chair. I shrieked, shouted blue murder, and let out lustily with my feet until I freed myself and made Herr Hunter, who stood ready with his instruments, understand that I absolutely refused operation." It may be added that only death parted Haydn from his polypus.—*The Weekly Times*, Feb. 22, 1939, p. 11.

THE DIAGNOSIS AND TREATMENT OF PERIPHERAL ARTERIAL DISEASE*

BY H. M. ELDER, M.D.

Montreal

THE problem of peripheral arterial disease is one which has been coming more and more to the notice of the medical profession. More accurate methods of determining the anatomical site of and the pathological lesion underlying the manifestations, and more diverse methods of treatment have stimulated a great deal of experimental and clinical research in this hitherto somewhat hopeless and rather neglected field.

It is the purpose of this presentation to outline briefly the methods of diagnosis and treatment presently in use at our clinic in the Montreal General Hospital.

The first difficulty encountered is that of nomenclature, inasmuch as there are, in the vocabulary of the average practitioner, insufficient names to cover all the cases. There is also the danger of misinterpretation, since it is rare that any two persons will have an identical conception of the term Buerger's disease, for example. It is felt, therefore, that, if all these cases are classified upon a basis of the anatomical site and the pathological lesion the interchange of ideas will be much more accurately accomplished.

In classifying these cases there are two pitfalls—one, that of seeing the patient, as all of us who work in such a narrow specialty are liable to do, merely as a mass of tubes; the other, that of the snap diagnosis, which leads one to distort clinical or laboratory findings, albeit unconsciously. Consequently, a complete examination of the patient is an essential preliminary before proceeding to the more specialized examinations, and a collection of all data before an attempt is made to arrive at a conclusion is necessary. It is our practice to have a technician carry out the oscillometric and skin temperature tests, which are not seen by the clinician until after the whole examination has been completed.

Peripheral arterial lesions may be classified in three main groups: (1) Those of an occlusive

nature, where there are definite changes in the vessel wall and a gradual obliteration of the lumen. (2) Spastic lesions, where there is no disease of the vessel wall, but a derangement of the neuro-vascular mechanism. (3) Mixed types, where obliteration is going on, but where there is an associated irritation and consequent spastic contraction in addition. In order to separate these some method of temporarily inhibiting the vaso-constrictor nerves must be used, and we have found spinal anaesthesia for the lower extremity and novocaine injection of the inferior cervical and first and second dorsal ganglia for the upper, very satisfactory, inasmuch as they produce an exact parallel to the results which will be obtained by operation.

First a history as to the strictly pertinent facts is culled from the general history of the case. The clinical examination then follows, noting the colour; the temperature as determined by the hand; moisture or lack thereof; blanching on elevation or cyanosis when dependant, taking two minutes in each position as a statutory time; and the estimation of the rapidity of capillary return, as determined by blanching the skin on pressure. Next the recording of pulsations of the various arteries, usually carried out with the patient recumbent. Then any other pertinent facts, such as skin atrophy, nail changes, etc. Lastly the x-ray report as to the presence or absence of calcification of the arteries.

It is our custom to regard the oscillometric curve as being indicative of the condition of the major vessels, and the skin temperatures as denoting the lesions of the arterioles and capillaries. We use a form to record all this.

The oscillometric readings are taken at every ten points of blood pressure from 200 to 20, and then, using the blood pressure readings as abscissæ in conjunction with the oscillometric index, the curve is plotted for the individual. Both these and the skin temperatures are recorded immediately before and immediately after inhibition of the vaso-constrictor nerves,

* Read at the Sixty-ninth Annual Meeting of the Canadian Medical Association, Section of Surgery, Halifax, June 23, 1938.

under identical conditions of room temperature and humidity.

In interpreting the data obtained by this examination we find four main types, into which, or with their combinations, all peripheral arterial lesions will fall.

1. A flat oscillometric curve, unchanged after vaso-constrictor inhibition, but showing a normal rise of skin temperature; hence classified as *major arterial occlusion*.

2. A normal oscillometric curve, with a normal rise after inhibition of the vaso-constrictor mechanism (since arterial muscle, like all other muscle, is normally in a state of tonus), but showing practically no change in the skin temperatures. This we call *arteriolar occlusion* (obliterating endarteritis).

3. A rather flat oscillometric curve, with marked change after constrictor inhibition, and a normal rise of skin temperature, classified as *major arterial spasm*.

4. A normal oscillometric curve, with a normal response to constrictor inhibition, but a very marked rise of the skin temperature. This we call *arteriolar spasm*.

Combinations of these may be met with.

It is felt that the treatment of these cases must be varied in accordance with the nature of the disturbance. In the occlusive group our efforts must be directed toward the developing of a collateral circulation which will be able

to nourish the extremity, even though the major vessels are completely occluded. Time does not permit a detailed exposition of the measures adopted to this end, though Buerger's exercises, contrast baths, passive hyperæmia and pavaex therapy are the chief agents, either alone, or in conjunction with some form of medication. In this connection, it is interesting to note that often a considerable improvement is produced in the major vessels themselves, even though the treatment is primarily directed toward the development of a collateral circulation.

In the spastic cases it is felt that interruption of the vaso-constrictor impulses is necessary, and it is our practice to do ganglionectomy operations on these patients if the symptoms are sufficiently severe to warrant operation.

The mild lesions are treated by a high calcium, high vitamin diet, and contrast baths. The mixed cases, we consider, require mixed treatment, and in these we relieve any spasm present by operation, and then proceed with the treatment, as if it were, as it in fact now is, a purely occlusive case.

In conclusion, it is felt that a thorough, careful and systematic examination with an accurate determination of the anatomical site and the pathology of the lesion is essential before rational or successful treatment can be carried out.

DEHYDRATION AND LUMBAR PUNCTURE IN THE TREATMENT OF CRANIAL INJURIES*

BY FRANK TURNBULL

Vancouver

MOST surgeons employ dehydration and lumbar puncture in the treatment of cranial injuries, yet the majority have no clearcut conception of the indications and contraindications for this particular form of treatment. Writers on this subject tend to present stereotyped outlines of rather complicated treatment and do not mention the uncertainty of their premises. There has been no conclusive report of the end-results of treating head injury cases with dehydration or lumbar puncture, or both, as compared with a controlled series of cases which did not receive such treatment. A reasonable plan

of therapy lies somewhere between the extremes represented by the enthusiast and the profound skeptic.

DEHYDRATION

Cedema of the brain is present to some extent in most cases of cranial injury. Unfortunately for precision in treatment it is usually impossible to assess in individual cases the relative extent by which cedema of the brain, hæmorrhage, or increase in cerebrospinal fluid consume the valuable intracranial space needed for the circulation of blood. The modern argument for dehydration is based on the concept of an injured and swollen brain in a relatively rigid

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cavity (the skull). As there are only three components in this space, namely brain, cerebrospinal fluid, and blood, and as the volume of cerebrospinal fluid is not reduced, it is apparent that the flow of blood must be restricted. Thus the injured brain is supplied not by more blood, as are injured organs elsewhere in the body, but by less blood. It is considered advisable under these circumstances to reduce the volume of the swollen brain and, presumably, allow for an increased circulation.

The available methods of dehydration are (1) restriction of intake of fluid; (2) increased elimination by (a) Epsom salts by mouth or in the form of "retention-enemas" and (b) drugs such as caffeine sodio-benzoate which increase urinary output; (3) hypertonic solutions given intravenously. An intelligent application of any of these methods in serious cases cannot be made unless a record is made of the intake and output of fluid from the time the patient is admitted to hospital. If the patient is incontinent the urinary output can be estimated by weighing the sodden bed-clothes before and after drying. (A pound in weight is roughly equivalent to a pint of fluid.)

The presence of shock contraindicates immediate dehydration. Recollection that dehydration is the ultimate aim will indicate the reasons for restricting fluids to the bare needs of the clinical situation. Trauma to the brain produces a primary shock which consists of a relative lowering of blood pressure secondary to vasodilatation. A supine position and measures to increase the warmth of the body usually alleviate this condition within a few minutes to half an hour. By the time the average patient reaches hospital only a mild degree of shock remains, and as a rule no special treatment is required.

Should there be a very profuse hæmorrhage from the scalp or nose a state of severe shock may exist. This shock will be of the "secondary" variety which is accompanied by vasoconstriction. Here there has been an absolute loss of blood volume and the patient requires fluid replacement, or preferably blood transfusion, until the blood pressure returns to a normal level. However, if the patient on admission to hospital shows signs of severe shock without evidence of marked loss of blood the situation is usually more serious. These patients may present an alarming combination of such signs of increased intracranial pressure as stertorous breathing and slow pulse and signs of shock

such as pallor and low temperature. The prognosis is desperate and treatment has little to offer. It is advisable in such cases during the first few hours to give stimulant drugs, such as caffeine sodio-benzoate or pituitrin, to keep the patient warm, to provide a free airway, and to defer giving fluid intravenously.

Unconscious patients who are admitted with signs of moderate primary shock, or conscious patients who are unable to retain ingested fluids because of vomiting, require fluid replacement in moderation. Giving such patients 10 per cent glucose intravenously in amounts not exceeding 400 c.c. for an adult, serves to provide nourishment and, by raising osmotic pressure of the blood, causes withdrawal of some fluid from the swollen brain. A more concentrated solution intravenously, such as 50 per cent glucose, would reduce intracranial pressure to a greater degree, but experimental and clinical evidence have proved definitely that this decrease in intracranial pressure which results from concentrated glucose injections is followed by a secondary rise in pressure which may completely nullify the early benefit. The intravenous injection of small amounts of 10 per cent glucose may be repeated two or three times during each 24 hours until the patient has recovered consciousness or has ceased vomiting.

If after 12 or 24 hours a slowing pulse or a deepening stupor indicate that these measures have not prevented intracranial pressure from rising a vicious circle of cerebral oedema and venous congestion has probably been established. Assuming that gross intracranial hæmorrhage has been ruled out, this patient will be benefited by repeated lumbar punctures and one or more intravenous injections of 100 to 200 c.c. of 50 per cent sucrose solution to increase the urinary output. Sucrose is not absorbed by the body and consequently there is not the same danger of preliminary dehydration followed by secondary hydration that there is with glucose. It must be recalled that sucrose provides no nourishment.

Elimination of fluid can be increased by giving magnesium sulphate by mouth or in the form of a "retention-enema". (In the adult 4 oz. of saturated solution of magnesium sulphate should be retained for 20 minutes. It may be repeated two or three times in 24 hours). Frequent enemas of magnesium sulphate, or repeated intravenous injections of sucrose, can increase elimination of fluid to the extent of

seriously depriving the whole body of water. Such a situation can only be prevented by accurate observation and control of all intake and output of fluid. Strict dehydration is not required in the treatment of mild cases, or in the more serious cases after they have recovered to the stage of being completely conscious and are free of signs of increased intracranial pressure. Changing from a liquid to a light diet as soon as possible, removing the water pitcher from the bedside, and giving occasional saline purges, will usually suffice.

LUMBAR PUNCTURE

Lumbar puncture has a place in the treatment of acute cranial injuries, but should be used when specifically indicated and not as a routine measure. Specific indications may be (a) for diagnosis regarding the state of intracranial pressure, the presence of blood in the cerebrospinal fluid, or meningitis; (b) the presence of marked increased intracranial pressure or of bloody spinal fluid, or both.

The following principles should govern the use of lumbar puncture in every case: (1) the use of a proper technique for puncture; (2) slow removal of fluid, controlled by manometric readings; (3) recognition of contraindications. If the puncture is made for the purpose of determining whether there is blood in the cerebrospinal fluid or not it is obviously important that there should be a minimum of trauma during the procedure. In order to be certain that the needle is not advanced too far the stylet can be removed after the skin has been pierced, and fluid will then flow as soon as the needle enters the subarachnoid space. If the operator is inexperienced or the patient greatly disturbed by the operation it is better to postpone or abandon the whole procedure. When fluid is removed to reduce intracranial pressure it should not be taken faster than 2 c.c. per minute, and repeated readings of the pressure should ensure that the fluid is not reduced by more than one-half.

Contraindications to lumbar puncture are: (1) an irregular, slow pulse and rising temperature, which probably indicates serious compression of the medulla; (2) signs of massive extradural hæmorrhage (here there is also a probability of medullary compression); (3) compound wounds communicating with a torn dura. Profuse bleeding from ears or nose may be included in this last category. In these cases lumbar puncture theoretically increases the probability of meningitis.

It is an old observation that patients who have profuse drainage of cerebrospinal fluid from an ear for several days after an injury, and who by good fortune do not develop mastoid infection or meningitis, practically always recover without sequelæ. The same slow steady drainage of spinal fluid directly from the base of the brain cannot be reproduced surgically with safety, and intermittent lumbar punctures or even continuous cisternal or lumbar drainage are an inadequate substitute. The majority of acute cranial injuries do just as well without lumbar puncture. Two groups however are benefited by occasional puncture, *viz.*: (1) the restless patient with severe headache and stiff neck whose fluid is bloody; (2) the patient mentioned in the discussion of dehydration whose intracranial pressure remains high after 12 to 24 hours. Patients in group one should have two or three punctures at eight- or twelve-hourly intervals if the first puncture is followed by definite symptomatic relief. Those in group two may require a greater number of punctures over a longer period.

The use of lumbar puncture in Workmen's Compensation cases deserves a special note. The seriousness of the injury is partly judged in the patient's mind by the treatment which he receives and a solitary lumbar puncture, particularly if it has been painful, may assume the proportions of a major operation. In later stages memory of his sore back will often serve to buttress a compensation neurosis.

CHRONIC ALCOHOLISM AND PELLAGRA. — Chronic alcoholism in civilized countries is a frequent cause of hypovitaminoses—especially of B factors and of C; it may thus cause pellagra. An alcoholic patient is described in whom a bullous and erythematous eruption, stomatitis, and diarrhœa, psychotic changes, and coproporphyrinuria occurred acutely after a brief sun-

bath, thus simulating Günther's acute porphyriopathy. The condition cleared up rapidly under treatment by nicotinic acid and a diet rich in vitamin B. The part played by perverted porphyrin metabolism and photosensitization in pellagra is discussed.—Bickel, G.: *Schweitzer. Med. Wchnschr.*, 1938, 68: 1159. Abs. in *Brit. M. J.*

A CASE OF MUMPS ENCEPHALITIS

By R. CAMERON STEWART, B.Sc., M.D., *Montreal* ANDPHIL. EDWARDS, B.Sc., M.D., *Bridgetown, Barbados*

NEUROLOGICAL disturbances associated with communicable diseases of virus origin are probably not uncommon, but the diagnostic signs may be so slight and transient that they are misinterpreted or ignored. Recovery in these minor and usually unrecognized cases is spontaneous and seemingly complete, and their possible significance, if any, in regard to the future health of the individual is unknown. More serious complications of this type, so severe and distinctive that they can hardly be overlooked, fortunately occur much less frequently. As scattered cases are reported from time to time it is thought that their incidence is growing, although part of this apparent increase may be due to a greater use of hospital facilities and consequently more intensive study, and also to a wider interest in the whole subject of virus infection, especially in the neurological field. Many instances, of course, remain unpublished. Various names are used to describe the clinical entity or entities, rather vaguely differentiated — meningitis, particularly of the acute aseptic type; meningo-encephalitis; encephalo-myelitis; and post- or para-infectious encephalitis. A few examples have been reported in Canada, including 6 cases of nervous complications associated with measles by Price,¹ of Calgary, and one of encephalitis following German measles by Goldbloom and Keith,² of Montreal. To these reports may now be added another, describing a somewhat similar case of presumably different etiology.

The patient, a white male of 41, with irrelevant personal and family history, contracted typical mumps. A son had the disease concurrently, and another son about two weeks before, so that there was no question of the diagnosis. Bilateral orchitis, accompanied by the usual pain and swelling, developed within eight days, and this was soon followed by headache, mild transient delirium, and occasional convulsive movements of the arms and legs. Admission to hospital was then advised about ten days after the onset of the parotitis.

The positive findings may be briefly summarized. On entry his temperature was 101°; pulse 108; respiration 24. Moderate swelling in the region of both parotids. Slight reddening and pouting about the orifice of Stenson's duct on each side. Pharynx reddened and both tonsils inflamed. Cervical glands palpable. Tongue dry and coated. Breath somewhat foul. Heart and lungs normal. Blood pressure 120/60. Abdomen distended. Liver and spleen not felt. Signs of bilateral orchitis. Reflexes normal; Babinski,

plantar flexion. Urine negative for albumin and casts. The blood Wassermann test was negative. Blood count: red blood cells 5,240,000; white blood cells 6,400; hgb. 92 per cent. Lumbar puncture findings: initial pressure 305, final 240; the fluid was slightly turbid; cell count 158 (80 per cent polymorphonuclears). Pandy test positive; chlorides 402; sugar 64.

About an hour after admission a convulsive seizure occurred, lasting for about three minutes, with tonic and clonic spasms of the arms and legs, associated with a fixed stare and followed by a brief temporary lapse of consciousness. Six other attacks were charted during the first 24 hours of hospitalization. On the assumption that cerebral oedema was present, 150 c.c. of 25 per cent glucose saline solution was given intravenously about 30 hours after admission. This was shortly followed by a convulsive attack, happily the last which was noted. The general condition improved so quickly that a second lumbar puncture, although scientifically desirable, was not considered advisable.

During convalescence a distressing flatulence proved quite refractory to treatment, lasting for about a week despite the use of enemas, rectal tubes, and hot turpentine stupes, but yielding finally to small doses of pituitrin. Other therapy included support to the testes, warm saline gargles, bed rest, and careful nursing.

The repeated convulsions and transient aphasia suggested a cerebral condition, and this was confirmed by the result of lumbar puncture. The relatively low cell count and normal sugar findings, pointed to encephalitis rather than meningitis, and this tentative diagnosis seemed to be supported by the brief duration of the attacks and long intervals of well-being, the slight febrile reaction, freedom from any marked toxæmia, and absence of localizing signs, and also by the short course of the disturbance and very rapid improvement. Whether the latter was aided by, or was only coincident with, the intravenous use of hypertonic glucose solution must remain an open question, as no convulsive attack had been noted for some hours previous to the injection, and one occurred soon after. The abdominal distension which was such a troublesome feature of the convalescence may have been due to some temporary paresis of the bowel, or merely to general weakness and lack of normal tone. There were no other noticeable signs of muscular involvement, and no evidence of a pancreatitis. It is admitted that further lumbar punctures would perhaps have placed the diagnosis on a somewhat firmer basis, but for the reason already given they were not carried out. Convalescent serum from a case of mumps with any similar type of complication was not available for trial.

Eleven days after admission to hospital, about three weeks after the onset of the mumps, the patient was sufficiently improved to be discharged. Further convalescence at home was uneventful, recovery was apparently complete, and his general health has now been good for more than a year. This favourable outcome is fortunately the usual one in the neurological complications of mumps.

The signs and symptoms of a post-infectious encephalitis or meningitis may be so multiform in character and varied in intensity and duration that no brief description can be adequate. The typical feature is the onset of central

nervous disorder, often accompanied by a rise of temperature, during the course or convalescence of a communicable virus disease. Any exact localization of the affected area is difficult or impossible; fortunately this is not of much practical importance and has little bearing on the treatment. The spinal fluid may be apparently normal, but usually shows some rise in pressure and increase of cells. A high cell count and lowered sugar content may roughly be taken to indicate a meningitis, a moderate cell count and normal sugar, an encephalitis. The pathological findings are often not very distinctive—signs of structural irritation, sometimes partial demyelination of nerve sheaths, and, usually, more or less oedema of the brain.

The etiological connection between the primary illness and the nervous disturbance is not clear, and may perhaps vary with the type of infection. Whether the first virus becomes under certain conditions itself neurotrophic, or whether it activates a second virus already present, or whether the condition is due to some kind of toxæmia or allergy, are still matters of discussion, especially in regard to the encephalitis occasionally associated with measles, German measles, smallpox, vaccinia, and influenza. That following chickenpox and herpes is thought by many to be caused by the direct action of the primary virus on nervous tissue, and this is probably also true in the cases connected with mumps.

The virus of epidemic parotitis is present in and transmitted through the saliva. It probably enters and leaves the parotid by way of

Stenson's duct. That it circulates at times in the blood stream or the lymph channels is indicated by the rather common involvement of the sex glands and more rarely of other organs, such as the pancreas. It may reach the central nervous system by the same route, or perhaps, like the virus of poliomyelitis, through nerve endings in the nose. Delirium, so frequently a rather unexplained feature of the early stages of parotitis, may possibly be due to its action on the cells of the brain. The occasional demonstration of a lymphocytosis in the spinal fluid of apparently normal and uncomplicated cases also tends to support the presumption that the virus may be at times neurotrophic, and hence capable of giving rise to the meningitis and polyneuritis sometimes reported, and to the condition here presented, which we have classed as encephalitis.

Acknowledgment is made of courtesies extended by Dr. H. B. Cushing, Physician-in-Chief, Dr. E. V. Murphy, Superintendent, and other members of the staff of the Alexandra Hospital, Montreal.

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O Star of Strength! I see thee stand
And smile upon my pain;
Thou beckonest with thy mailed hand,
And I am strong again.

The Star of the Unconquered Will,
He rises in my breast,
Serene and resolute, and still,
And calm and self-possessed.

Oh, fear not in a world like this,
And thou shalt know ere long
Know how sublime a thing it is
To suffer and be strong.

(Light of Stars—Longfellow.)

THE NOBLE NATURE

It is not growing like a tree
In bulk doth make a man better be;
Or standing long an oak, three hundred year,
To fall a log at last, dry, bald, and sere:
A lily of a day
Is fairer far in May,
Although it fall and die that night;
It was the plant and flower of light;
In small proportions we just beauties see;
And in short measures life may perfect be.

(Ben Jonson).

A CASE OF PELLAGRA IN BRITISH COLUMBIA*

By F. N. ROBERTSON, M.D. AND D. E. H. CLEVELAND, M.D.

Vancouver

IT is observed from the references in the Index Medicus over the past 18 years that the annual increments to the literature of pellagra are steadily increasing. It is noticed from the titles of many papers that the geographical distribution of the disease has been considered a matter of some interest. Although pellagra appears to be commoner in warm countries, an increasing amount of the disease is being observed in the United States, including those states along the northern border. It is rather surprising therefore that extremely few cases have been reported from Canada. No doubt a larger number of cases have occurred, but due to non-recognition or other causes they have not been reported.

A case which occurred in a rural district of northern New Brunswick in 1915 was reported by L. G. Pinault,¹ of Campbellton. Another case, in which carcinoma of the stomach was also present, was reported by F. W. Rolph² in Toronto in the following month. Malcolm Mackay,³ of Sherbrooke, Que., reported two cases which he had seen in 1920, and diagnosed as pellagra. One of these did not present the usual mental changes and recovered. The other had cancer of the uterus and died. Both patients were women. Finally two more cases, also in women, were reported by G. H. Stevenson⁴ which were seen in Ontario in 1921. In his bibliography the author referred to three cases reported by J. M. Forster and C. S. McVicar, of Toronto, and F. S. Vrooman, of Brockville, in the *Bulletin of the Ontario Hospitals for the Insane* in January, 1914, and a case by C. A. McClennahan in the same Bulletin in July, 1916. There is one more reference in the Index Medicus to a case reported by A. Desforges,⁵ in Quebec, but we have not had access to the journal in which it was published. Recently, Palmer⁶ reported a case occurring at Verdun, Que.

It would thus appear that not more than 12 cases of pellagra in all have been reported in Canada. None of these occurred west of Ontario. The publication of the following report of a case in British Columbia, if for no other

reason than its geographic location, would seem to be justified. Unfortunately the brief time during which the patient was under our care did not permit a complete laboratory investigation, or any observation of the results of treatment. It is believed that the case was clinically typical, the principal diagnostic criteria of enteritis, cutaneous changes, and mental derangement all being well exhibited.

CASE REPORT

G.C., a white male, aged 60, a physician, was admitted to the medical wards on July 29, 1938. The chief complaints were abdominal pain with occasional vomiting for 14 months; dermatitis for 3 months; diarrhoea for 3 weeks.

The history was difficult to obtain because of the patient's mental condition, but is summarized from hospital records of a previous admission, and the patient's statements made at different times to attendants. He had spent the greater part of his life in China. While there he had typhoid fever, typhus and influenza. Except for childhood diseases his health had been good until 1927. Since then he had suffered from intermittent attacks of pain in the epigastrium during periods of 6 to 10 days, every 3 to 6 months. The pain had been of a gnawing character, coming on 1 to 2 hours after food and at night. After the death of his wife in June, 1937, the pain had frequently been associated with vomiting.

In September, 1937, he was admitted to the Vancouver General Hospital with a diagnosis of duodenal ulcer and chronic appendicitis. A posterior gastroenterostomy was done. There was a duodenal ulcer, pyloric stenosis, toxic duodenitis, and an appendix whose lumen was obliterated in the mid-section, attached to a mobile caecum. The appendix was removed and the caecum secured. Convalescence was stormy, there being much post-operative shock, with cyanosis (avertin-ether anaesthesia was used) and much abdominal pain. The wound did not heal well, and during the last few days before discharge there were frequent loose, occasionally involuntary, stools. No mental symptoms were noted during his stay in hospital.

During the succeeding 10 months there was frequent burning pain in the epigastrium, at times awakening him from sleep. For the previous 6 months there had been occasional vomiting of yellowish fluid, and he had vomited twice in the 6 hours immediately preceding re-admission to hospital. There had been no hæmatemesis.

During this last period he had been practising in a small mining camp, and had apparently suffered considerably from hardships and privations due to various causes. He had no venereal infection, and did not use alcohol or tobacco. He stated that for some time past his diet had included no fresh food of any kind, everything, including milk, being tinned. A dermatitis had been present on the backs of the hands for 3 months, being erythematous at first. Diarrhoea had been present for 3 weeks, there having been 3 to 5 watery stools daily, containing mucus but no fresh or old blood. No medication had succeeded in checking it. He stated that several people in his neighbourhood had had diarrhoea about the same time.

*From the Medical Wards of the Vancouver General Hospital.

On examination the patient was seen to be pale and poorly nourished. He was extremely depressed and apathetic, and spent most of the time lying on his back or on his right side, facing the wall next his bed, with his eyes closed. When roused he spoke in a low, expressionless voice, replying to questions only, and with very few words.

Both jaws were edentulous, with the exception of a single carious molar. The anterior half of the tongue was smooth, red and dry, resembling the tongue of pernicious anaemia. The posterior half presented a decided contrast, being rugose. His temperature and pulse were slightly elevated. The blood-pressure was 150/92 (taken a few hours after 2 or 3 litres of glucose saline had been given intravenously). It was noticed that the superficial arteries, radial, temporal, etc., were thickened. There was a hernia about 2½ inches in diameter in the gastro-enterostomy scar. Both inguinal canals were patulous to the finger, but there was no cough-impulse. Otherwise the abdomen was apparently normal.

The skin was dry and rough, especially on the face and extremities. That of the medial portion of the cheeks, the nose, forehead and chin had a thick greasy character, and was thickly studded with minute projecting follicular plugs of corneous material. This gave the face a dark or dingy appearance, although there was no abnormal pigmentation.

The hands presented a striking appearance. The skin was thick and hard, on the dorsal surface resembling thick parchment, and of a deep greyish-brown colour like "muddy" coffee. This discoloration did not extend to the palmar surface, and ended abruptly with the cuff-line on the wrists. The thickening was less marked on the feet and there was no discoloration. There was an eczematous eruption with scaling and crusting on the dorsum of both hands. There was no abnormal axillary, ano-genital or flexural pigmentation.

No other abnormalities were noted on physical examination, nor in the routine laboratory examinations of the blood and urine. The urine was not examined for porphyrins; no ova or parasites were found in the stool.

The patient slept little, had no appetite, took only a little liquid food, was unable to retain oral medication, and vomited and passed liquid stools frequently. He continued to grow weaker and more depressed, and stated on several occasions that he was dying. Approximately 60 hours after admission his colour suddenly became dusky, his extremities cold, and after a brief period of dyspnoea he died.

Autopsy was performed less than three hours after death. There was generalized arteriosclerosis but the coronaries were not particularly involved, myocardial degeneration, chronic glomerulo-nephritis, and a right-sided bronchopneumonia. There was a general gastro-enteritis and colitis, but no indication of old or recent ulcer in the stomach, duodenum, small bowel or colon. The brain was not grossly abnormal, and unfortunately the cord was not removed for examination. The pathologist noted that the hands were greyish-brown in colour. It had not been possible to arrange for a photograph before death, nor until 24 hours after death. It then proved to be of no value so far as pigmentation was concerned, for, as the photographer described them, the hands were "as white as marble".

The rapid depigmentation of the hands after death was puzzling, but we are indebted to Dr. S. W. Becker, of the University of Chicago, for a suggested explanation made in a personal

communication. It is therein stated that in pellagra the pigmentation is secondary to the dermatitis, and comes from some blood-pigment in the skin, but chiefly from the darkening of the exfoliated dry epidermis. Soap and water scrubbing would have removed much of this pigmented corneous layer, leaving only some colour due to blood-pigment. While it is apparently true that the dermatitis is due to a photosensitizing substance liberated into the circulation, it is not necessary to invoke an internal chemical change to account for the disappearance of the colour suddenly after death.

COMMENT

A case of pellagra is described which is believed to be the first reported from western Canada and the 12th reported in Canada. The patient had had gastro-intestinal symptoms for 11 years, culminating in the gastro-enteritis, cutaneous and mental changes which constitute the characteristic syndrome of pellagra.

There had been an abnormal, and probably very deficient, diet for several months prior to the onset of the characteristic symptoms, but it is considered probable that if avitaminosis was the principal or sole etiological factor it had its inception at a much earlier date, and was probably digestive rather than nutritional in origin. This could have been accounted for by the pathological conditions found in the upper gastro-intestinal tract found at operation in 1937. In this connection it should be remarked that association between pathological conditions in the gastro-intestinal tract and pellagra has been observed and commented upon by other students of this disease, notably G. B. Eusterman.^{7,8}

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Case Reports

A CASE OF ENCEPHALITIS EPIDEMICA (LETHARGICA) TREATED BY SULPHANILAMIDE

By NORMAN VINER

Montreal

On July 18, 1938, the patient entered the service of Dr. A. O. Freedman, Jewish General Hospital, Montreal, complaining of defective speech, and weakness of one vocal cord was determined. This, incidentally, improved in the course of the next few days. The patient stated that he had noticed a little tickle in his throat for the past two or three years, and that the trouble had increased until a year and a half before, when he observed that his speech had become harder to understand, and also that on account of increased salivation he was finding it more and more difficult to speak.

Seen by the writer, July 20, 1938, the patient presented a typical case of Parkinsonism, with no certain evidence of a preceding acute onset with encephalitis obtainable. Routine general examination was completely negative. His intelligence was very good and his mental attitude apparently normal.

Neurological examination.—Motor power, development, nutrition, and tone normal, except for the Parkinsonian gait and carriage, absence of the associated automatic movement of the left arm, some tremor of the left arm and hand, and a certain amount of rigidity of the left arm and leg. Sensation normal in all phases. Coordination was normal except for left adiokokinesis, which was attributed to the rigidity of the left arm. The reflexes were all normally present. Cranial nerves: absence of accommodation and convergence. Rigidity and limitation of movement of eyes in all directions; blinking was markedly diminished. The facies was mask-like, with little loosening-up on smiling. Salivation. Marked slowing and thickening of speech, so that he was hard to understand. No other cranial nerve defects.

The blood Wassermann test was negative. Spinal fluid; pressures were normal; Wassermann test, colloidal gold, and colloidal benzoin tests were all negative; there were 40 cells per c.mm., all polymorphonuclears; sugar 73.5; total protein 27.3, and chlorides 5.7 milligrams per 100 c.c.

On July 27, 1938, he was given sulphanilamide mg. 10, t.i.d., and as he developed a squint of the left eye a few days later he discontinued that drug and went out of town about August 4th, the squint disappearing about a week later. Seen again on August 31st, the patient complained of lack of improvement and was again given sulphanilamide, but this time mg. 40, t.i.d. On September 7th he stated that he was feeling physically and mentally much more alert, and that his speech was improving. (He had made no complaint of mental dulling before). Neurological examination showed nothing remarkable.

October 13th the patient, still on sulphanilamide, reported subjective improvement, and, objectively, appeared to show less salivation, less rigidity, slightly more movement of the eyes, and apparently more left arm swing. November 10th the patient was subjectively as before; objectively, there was definitely more movement of the eyes, he smiled broadly, salivation was diminished and there was, definitely, a returning swing to the left arm. During all this period the patient has been under sulphanilamide, varying from 20 to 40 mg., t.i.d., with one rest interval of about a fortnight. In the past few weeks he had also been receiving hyoscine hydrobromide, gr. 1/100, t.i.d.

The writer saw many, if not most, of the acute encephalitis cases here in the epidemic of 1920, and the sporadic ones afterwards. He saw most of the cranial and other nerve symptoms come and go spontaneously. He does not remember a single case of the subsequent Parkinsonian complex improving under any treatment, especially as in this case at least two years after the onset. Here the exhibition of sulphanilamide has been associated with improvement, which, although the patient is still obviously Parkinsonian, is indubitable. He therefore feels that this case is worth recording.

APLASTIC ANÆMIA*

By M. C. DINBERG, B.Sc., M.D., C.M.

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Two contrasting instances of aplastic anæmia are presented. The similarity of these two cases, from clinical and hæmatological investigation, would invite a like diagnosis with a grave prognosis for each. The first case, however, belongs to the group of idiopathic aplastic anæmias with fatal termination; the second case is one of aplastic toxicosis of unknown origin, followed by apparent permanent recovery.

CASE 1

A.S., a single white girl, church organist, aged 25, was referred to hospital for investigation with complaints of weakness, fainting attacks, and "crops of bruises," all of approximately two months' duration. Coccygodynia and persistent pain in the left hip had been present for ten months and was attributed by the family physician to pedalling at the pipe organ. Pulmonary tuberculosis had proved fatal to two siblings.

One month prior to hospitalization the patient was examined elsewhere at a chest clinic with negative findings in regard to the lungs, spine, and left hip. Soon after this investigation the patient noticed areas of apparent bruising over the legs and arms, arising spontaneously and varying from one-half to two and one-half inches in diameter.

Her temperature, pulse rate, and respirations on admission were normal. The blood pressure was 126/72 mm. Inspection revealed a well developed, moderately well nourished, white female whose skin was definitely pallid. The lips and pharyngeal mucosa were pale. Petechiæ and larger areas of ecchymosis of varying size as noted above were present on the face and the upper and lower extremities. The regional lymph nodes, the spleen, and the liver were not palpable.

Hæmatological examination was as follows: red blood

* From the medical services of Dr. W. T. Connell and Dr. M. J. Morison.

cells, 2,050,000; hgb. (Sahli), 45 per cent; white blood cells, 2,400, with polymorphonuclear leucocytes 63 per cent, lymphocytes 31 per cent, mononuclear cells 5 per cent, and eosinophiles 1 per cent. The absolute scarcity of blood platelets precluded an accurate count. Vital staining for reticulocytes revealed only three reticulated erythrocytes after careful search of approximately 12,000 cells. Blood smears revealed erythrocytes of normal size and shape, but with a considerable degree of hypochromia. Bleeding and coagulation times were slightly prolonged. The red cell fragility test was within normal limits, as was the sedimentation rate. The serum calcium level was normal. The capillary resistance test was strongly positive, and it was noted that wherever the finger was punctured a small zone of subdermal hæmorrhage resulted.

Efforts to determine a toxic factor in this case were unsuccessful. No focus of infection was demonstrable in nose, sinuses, throat, or teeth. The final diagnosis was idiopathic aplastic anaemia, with grave prognosis. The patient returned to her home in a distant city on the third day after admission. The therapeutic use of small frequent blood transfusions was recommended to the patient's physician but, in spite of this treatment, she expired within one month. An autopsy was not obtained.

CASE 2

G.H., single, a white male, office worker, aged 21, was admitted to hospital complaining of a generalized "miserable feeling" and headache of two days' duration. The onset of symptoms was abrupt with headache and chill, followed on the second day by a fainting attack. Approximately one month before the patient had had a transient abdominal attack, diagnosed as appendicitis. The family history was negative.

The patient was a well developed but poorly nourished white male, with very pale skin and mucous membranes. The regional lymph nodes, spleen, and liver were not enlarged. The temperature on admission was 100° F.; pulse, 83; respirations, 20. Hæmatological examination revealed a red blood count of 3,450,000; hgb. (Sahli), 75 per cent; white blood cells, 2,500, with polymorphonuclear leucocytes 58 per cent and lymphocytes 42 per cent. The blood smear indicated a normal erythrocytic picture but there was definite thrombocytopenia. The reticulocyte count was within normal limits, as were the bleeding and coagulation times. In an attempt to stimulate a leucocyte response, 1 c.c. of sterile milk was injected intramuscularly; in one hour the white count had not increased materially.

In view of the leucopenia, a suggested diagnosis of typhoid fever was made; agglutination reactions for typhoid, paratyphoid, and undulant fever were negative. Blood culture was sterile.

On the basis of the continued low-grade fever and the blood picture a diagnosis of toxic aplastic anaemia was made. On the fourth day a small blood transfusion of 225 c.c. was given, using the patient's brother as donor. Within ten hours the patient's temperature dropped to normal and the white count rose to 7,500. With continued improvement the patient was discharged from hospital on the eighth day. There has been no recurrence of symptoms in over a year.

These case histories emphasize the necessity for guarded prognosis where aplastic anaemia has been diagnosed. The patient should receive small blood transfusions, repeated if necessary at frequent intervals, for it is often impossible to determine with certainty the presence or absence of a toxic factor.

PORTAL CIRRHOSIS

By L. R. MARWOOD, B.Sc., M.D.

Thornhill, Ont.

J.B., aged 75, a labourer, of intemperate habits, complained on August 1, 1938, of having had frequent nose-bleeds for one year; progressive increasing girth with oedema of the lower extremities and genitals for seven months; marked dyspnoea and anorexia for two months; and scanty urine for two weeks.

Examination revealed an emaciated, toxic man with a bronzed tint to the skin. The mucous membranes were of good colour; the tongue heavily coated and the breath heavy. Orthopnoea. His hearing was markedly impaired. The abdomen was enormously distended by fluid; the superficial veins, filling from below upwards, were numerous and prominent on the anterior thorax and on the abdomen above the umbilicus. There were four herniæ, *viz.*, two small epigastric, an umbilical, and an incomplete left inguinal. The lower extremities and genitals were markedly oedematous. The lungs were normal. The cardiac impulse was forceful and clearly visible in the third left interspace. There was no cardiac enlargement, the quality of the sounds was good, and the rhythm normal. The pulse was 80; blood pressure 140/80; hgb. 72 per cent; red blood cells, 3,750,000 and the Wassermann test negative. The urinary output in 24 hours was 16 ounces; specific gravity 1.026; albumin and sugar, negative; non-protein nitrogen 56 mg.

On paracentesis two gallons of clear straw-coloured ascitic fluid were readily obtained and the abdomen was not completely drained. The liver and spleen could not be palpated, nor could any mass be found. A diagnosis of portal cirrhosis was made. During the following four weeks the patient received all the common diuretics, singly and in combination, per os and intravenously and in ample dosage. Despite this, paracentesis had to be resorted to on three more occasions. The patient lived some miles in the country and hospitalization was refused.

On September 3, 1938, following the removal of one and a half gallons of ascitic fluid, the abdomen was opened in the lateral aspect of the lower right quadrant under local anaesthesia. The incision was made long enough to admit the folded fixed flange of a tube commonly used for the closed drainage of empyema. This flange, about 6 cm. in diameter, was introduced into the peritoneal cavity, and the redundant peritoneum closed about the tube. The skin was sutured, an iodoform dressing applied to the wound, and the sliding outer flange of the tube fitted snugly to the abdomen. A clamp was placed on the free end of the tube. The convalescence was uneventful; fever, not exceeding 100.4°, occurred on the two days immediately following operation; no leakage was encountered after four days. His wife, at intervals of from two to four days, opened the clamp and drained off the accumulated fluid and it always drained readily. His appetite improved somewhat, he was given all the fluid he desired, and he was able to sit in a chair comfortably. A growth of *Staph. albus* was obtained from the ascitic fluid on September 16th. His wife became indisposed, necessitating his removal to hospital on October 5, 1938. The indwelling tube was then removed, but the abdomen continued to drain through the resulting sinus. The clinical course was retrogressive; fluid developed in the right pleural cavity, a sharp pain in the chest on October 12th ushered in a diffuse bronchopneumonia, and death occurred on the 16th.

The chief findings at autopsy were: The abdomen was free from fluid except the lesser sac. The intestines were matted together by fragile fibrinous bands; there were comparatively few adhesions between the visceral and parietal peritoneum. There was extensive fibrino-

purulent peritonitis of a low grade, the left hernial sac was distended by fibrinopurulent material and a small subdiaphragmatic abscess was found on the right side. The artificial sinus was patent. The liver was small, typically hobnailed, and weighed 850 grams. The spleen was enlarged, engorged, and weighed 450 grams. Esophageal varices were prominent. The right pleural cavity contained 1,100 c.c. and the left 350 c.c. of dark amber-coloured fluid. The right lower lobe was collapsed, and both lungs showed extensive bronchopneumonia. *B. coli* was cultured from the peritoneal cavity; the blood culture was negative. Microscopic examination of the liver confirmed the diagnosis of portal cirrhosis.

It is of interest to note that permanent drainage of the abdomen effectively controlled the ascites and oedema; that despite widespread low-grade fibrinopurulent peritonitis the patient was free from pain, tenderness, and distress in his abdomen, and that he was continuously afebrile apart from the two days immediately following operation and those days associated with the terminal bronchopneumonia.

Therapeutics and Pharmacology

THE ABSORPTION AND UTILIZATION OF IRON SALTS*

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As a result of the investigations of Starkenstein,¹ Süllman,² Hendrycks, Lintzel³ and others, which began about eight years ago, considerable light has been thrown on the metabolism of iron in food and of iron salts taken medicinally. A study of the chemical reactions taking place in the stomach when iron preparations were administered along with food led these workers to the conclusion that the soluble iron salts, entering the intestine for absorption, must be ferrous salts, in which the iron is in an ionized form. Further, they were of the opinion that small doses of soluble ferrous salts could replace large doses of ferric salts in medicine. Reimann and Fritsch⁴ later, in a long series of tests on anæmic patients, produced clinical evidence that small doses of iron such as the soluble ferrous chloride were as effective as massive doses of iron in the form of soluble ferric salts or reduced iron.

The chemical reactions involving iron and the products of gastric digestion in the stomach are very simple, and will not puzzle any clinician who will spend a few minutes studying them. Every physician knows that soluble ferric salts, such as ferric chloride in the solution of the perchloride of iron, are good styptics and have a very astringent taste. This is due to their combination with proteins with which they will form insoluble compounds, even in acid solution. It is also common knowledge that carbonates and phosphates are very likely to be present during peptic digestion. These two products will readily form insoluble ferric compounds. The probable fate of most of the soluble ferric salts placed in the stomach after a meal is that they will soon be locked up as an insoluble proteinate, carbonate or phosphate, from which no absorption can take place as they pass through

the intestine. However, another simple and very important reaction occurs in the peptic digest. Small amounts of reducing substances are formed which will convert some of the soluble ferric salts to soluble ferrous. These latter are not so readily precipitated by proteins. Therefore, as a result of this reduction of soluble ferric salts, there is always a possibility of the formation of a small amount of ferrous salts in the stomach.

Iron and ammonium citrate is a very soluble ferric salt used a great deal in medicine. A solution of it has not the astringent taste characteristic of ferric chloride, nor does it precipitate protein, for the iron is in a complex form. If some hydrochloric acid is added to a solution of iron and ammonium citrate it quickly develops the astringent taste, and added protein will precipitate, showing that the iron now is in a state similar to that in the solution of perchloride of iron and will have the same fate as the ordinary soluble ferric salts. The fact that two chemical reactions must take place before soluble ferrous salts are formed from this complex indicates that even larger doses than those of the perchloride of iron will be necessary for medicinal purposes.

Reduced iron or metallic iron in the form of a fine powder cannot be absorbed as such. It must be dissolved before it is of any use. The hydrochloric acid in peptic digestion readily converts metallic iron into soluble ferrous chloride, which can be utilized by the body. Metallic iron is also slowly attacked by carbonic acid in solution and a small amount of soluble ferrous bicarbonate is formed.

Soluble ferrous salts do not form insoluble proteinates, nor do they form insoluble carbonates and phosphates as readily as do soluble ferric salts. The presence of some hydrochloric acid in the stomach tends to keep the ferrous salts in solution better than it does the ferric. It is evident therefore that gastric hydrochloric acid plays an important rôle in iron metabolism. The absorption of iron by the intestine can take place only when the iron is in solution, and as the acid peptic digest entering the duodenum may contain dissolved ferrous salts absorption of iron may begin as soon as the digest enters

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the duodenum. As the digest passes down the intestine and is mixed with the alkaline bile and pancreatic juice its acidity decreases, and soon the soluble ferrous salts are changed to insoluble ones. A low gastric acidity such as is present in many cases of secondary hypochromic anæmia and in anæmic children introduces several complications. In the first place, large amounts of complex soluble ferric salts or reduced iron must be administered so that a large surface is presented to facilitate the chemical reactions with the hydrochloric acid and reducing substances which produce ferrous salts. Secondly, the lower the acidity of the gastric digest entering the duodenum, the sooner will it become neutralized, with the resulting precipitation of ferrous salts.

Some experiments on rats reported by Lintzel substantiated the theory that the ferrous salts were the only ones absorbed from the intestine. He fed rats a diet rich in iron, but added to the diet an organic substance, α - α -dipyridyl, which in itself was non-toxic but which rapidly formed a complex red dye with ferrous iron salts. This dye was not decomposed in the stomach or intestine and therefore prevented the absorption of ferrous salts. The contents of the stomach of some of the rats, when examined a few hours after a meal, were coloured red, showing the presence of the ferrous iron α - α -dipyridyl complex. All the rats left on the diet became anæmic. This work was repeated by us, using a few rats, feeding them on Mead's cereal, with and without α - α -dipyridyl. The results obtained were in accord with those reported by Lintzel. The animals in which the absorption of ferrous salts was inhibited lost about 50 per cent of their hæmoglobin in seven weeks (Table I).

TABLE I.

EFFECT OF LOSS OF FERROUS IRON IN DIET DUE TO PRESENCE OF ALPHA-ALPHA-DIPYRIDYL

Hæmoglobin in grams per 100 c.c. of blood
Alpha-alpha-dipyridyl and Mead's cereal

Initial Hgb.	Hgb. at end of 7 weeks	Loss of Hgb.	Gain weight 7 weeks
12.5	6.3	-6.2	+20 g.
10.5	4.8	-5.7	+44 g.
12.0	7.0	-5.0	+48 g.
Control with Mead's cereal			
11.8	11.0	-0.8	+64 g.
11.0	11.0	0	+20 g.
10.6	10.0	-0.6	+50 g.

The staff of the Department of Pharmacology became interested in this new iron therapy, and undertook the preparation of a stable ferrous chloride mixture for physicians' use. This was accomplished by diluting a freshly prepared strong solution of ferrous chloride with simple syrup. The formula for this preparation was published in the Canadian Formulary and is as follows:

SYRUPUS FERRI CHLORIDI C.F.

R		
Ferri redaeti	gr. xxiv	0.8 g.
Acidi hydrochloridi diluti	$\frac{3}{4}$ i	16.6 mils
Acidi hypophosphorici	$\frac{3}{4}$ ss	1.0 mil
Syrupi ad	$\frac{3}{4}$ vi	100.0 mils

Dose— $\frac{3}{4}$ i or 4 mils, diluted to about $\frac{3}{4}$ i or 30 cc.; may be doubled if necessary.

The reduced iron and hydrochloric acid are placed in a 6-ounce bottle (100 mils) and gently warmed by immersing the bottle in warm water. When the iron is completely dissolved (any residue may be filtered out if necessary) the hypophosphorous acid and the syrup are added to produce 6 ounces (100 mils). This syrup contains about $\frac{1}{2}$ grain (32 mg.) of iron in the ferrous form in each dose and is a palatable form for administering ferrous iron, which may be substituted for massive iron dosage when it is necessary.

Some excess of hydrochloric acid was purposely left in this preparation, for it was considered that a small amount of hydrochloric acid might be useful when the secondary anæmia under treatment was accompanied by low gastric acidity. Later it was found that a very palatable and stable syrup, and one free from hydrochloric acid, could be made by dissolving pure ferrous chloride crystals in a little water and diluting the solution with simple syrup. The ferrous salt was placed on the market by the British Drug Houses. To make 6 fl. oz. of the syrup, weigh out 85.5 grains of the salt, dissolve in a little water, and dilute to the required volume with syrup. In the Addendum to the B.P. a stable form of ferrous chloride called Ferri Subchloridum Citratum has been made official. This salt may contain a small percentage more ferrous iron than the ferrous chloride crystals, but a syrup essentially the same as the above can be prepared in the same manner.

Experimental tests on rats were begun in the Department of Pædiatrics and the Hospital for Sick Children, to compare the value of soluble ferrous iron with soluble ferric, and the complex iron and ammonium citrate. Syrupy solutions of ferrous and ferric chlorides were employed for the ionized salts, and a syrupy solution of iron and ammonium citrate was used as an example of a complex or non-ionized ferric salt. The ferrous and ferric solutions were prepared from the purest form of reduced iron obtainable, which was copper-free as far as analytical methods would show. The iron and ammonium citrate was the best variety sold by Burroughs & Wellcome. Each preparation was made so that *per diem* each rat received 0.5 c.c. of syrup, the carbohydrate intake thus being the same in all cases.

A few preliminary experiments soon showed that 0.5 mg. of iron in almost any form without copper, fed to 100-gram rats, whose hæmoglobin on a milk diet had been lowered to approximately 4 mg. per 100 c.c., was sufficient to produce such gains in hæmoglobin in 5 weeks that no difference between the salts could be detected. These results differ from those of Elvehjem and Sherman,⁵ who could not obtain

any gain unless copper was added to the iron. It is possible that some copper stores still remained in the bodies of our rats. Hæmoglobin was estimated weekly by the Newcomber method, but only the gain at the end of five weeks is reported. The final experiments were then directed to find the minimum amount of iron required in the diet in the form of the soluble ionized ferrous or ferric chlorides or the soluble complex non-ionized iron and ammonium citrate which, with or without the addition of copper, would give a good gain in hæmoglobin.

TABLE II.

EXPERIMENTS ON RATS
RESULTS IN GRAMS OF HÆMOGLOBIN PER 100 C.C.
OF RATS' BLOOD
GAIN REPORTED AT THE END OF FIVE WEEKS
0.025 MG. OF $\text{Cu SO}_4 \cdot 5\text{H}_2\text{O}$ GIVEN DAILY WHEN
COPPER WAS GIVEN

Iron salt	Mg. of iron per diem	Number of rats	No copper		With copper	
			Initial Hgb.	Average gain	Initial Hgb.	Average gain
FeCl_2	0.25	10	3.9	5.2	3.5	6.7
FeCl_3	0.25	9	3.6	3.7	3.8	4.9
Iron and ammonium citrate....	0.25	6	4.0	3.7	4.0	3.7
FeCl_2	0.15	6	2.7	3.7	2.9	7.5
FeCl_3	0.15	6	3.1	2.2	3.0	5.4
Iron and ammonium citrate....	0.15	5	3.5	1.9	3.4	4.2
FeCl_2	0.05	10	3.4	2.5	3.5	5.5
FeCl_3	0.05	10	3.5	2.6	3.4	4.9
Iron and ammonium citrate....	0.05	8	3.4	0.9	3.4	0.9
FeCl_2	0.025	9	3.4	0.9	3.6	5.3
FeCl_3	0.025				4.0	1.5
FeCl_2	0.01	9			3.0	2.9

From the gains in hæmoglobin reported in Table II it is evident that when equal amounts of iron below 0.5 mg. per day are fed to rats in the form of ferrous or ferric chloride or iron and ammonium citrate, equal gains in hæmoglobin do not occur. The findings substantiate the theoretical claims made from the study of the chemical reactions of iron salts in the gastric digest, namely, that in order to provide sufficient iron for ample hæmoglobin formation, larger quantities of ionized soluble ferric salts would be necessary than of ionized soluble ferrous, and, in turn, still greater quantities of the complex iron and ammonium citrate must be given. When the quantity of iron reached the low level of 0.025 mg. per day the increase in hæmoglobin obtained by use of soluble ferric chloride was only 35 per cent of that from ferrous chloride.

The value of ferrous chloride and iron and ammonium citrate was tested clinically in the

treatment of nutritional anæmia in infants and older children. From the results in Table III it is evident that doses as low as 10 mg. (1/6 gr.) of iron per day in the ferrous state, when

TABLE III.

EXPERIMENTS ON INFANTS

Child	Age in months	Medication	Hæmoglobin, grams per 100 c.c. blood				
			Weeks				
			Initial	1	2	3	4
1	13½	60 grains of iron and ammonium citrate daily = 12 gr. iron daily = 750 mg. iron daily. Milk diet.	8.0	8.2	..	10.2	..
2	8		8.2	8.8	..	..	..
3	3		9.5	10.0	12.4	..	..
4	6		6.8	6.8	..	..	..
5	17		6.2	7.0	6.9	..	..
6	13		9.8	9.9	9.2	..	..
1	17	10 mg. (1/6 gr.) iron as ferrous chloride daily. Milk diet.	6.9	9.2	8.5	8.5	..
2	23		5.4	7.0	6.0	..	..
3	7		8.4	10.2	..	..	..
4	3		8.8	10.8	9.8	10.2	..
5	7		7.2	9.8	..	..	..
6	14		4.1	5.0	4.4	5.6	..
1		Syrup of ferrous chloride 10 mg. (1/6 gr.) of iron + 4 mg. of copper sulphate.	6.8	9.2	8.0	9.0	..
2	16		9.2	10.2	12.2	12.6	..
3	4		4.8	6.4	9.8	..	..
4	9		6.2	5.4	..	..	..
5	9		8.1	8.8	9.8	10.2	9.8
1	13	33 mg. (½ gr.) iron daily as ferrous chloride. Milk diet.	7.0	6.8	10.9	9.8	10.9
1	6	48 mg. (¾ gr.) iron daily as ferrous chloride. Milk diet.	6.8	8.8	10.5	10.2	10.2
2	6½		8.8	11.4	11.2	10.8	..
3	22		3.2	5.2	..	..	..
4	11		7.8	10.2	..	..	..

TABLE IV.

EXPERIMENTS ON OLDER CHILDREN

Child	Age in years	Medication. Mg. of iron as ferrous chloride per diem. Ordinary diet.	Hæmoglobin, grams per 100 c.c. blood.					
			Weeks					
			Initial	1	2	3	4	5
1	2	66 (1 gr.)	9.2	10.4	..	..	..	..
2	5	100 (1½ gr.) 150 (2½ gr.)	7.0 5.3	6.5 5.3	7.2 7.2	5.3 8.8	.. 9.2	.. 11.8
3	5	130 (2 gr.) 200 (3 gr.)	3.8 5.0	5.0 8.5	.. 11.0	.. 10.8	..	..
4	3	50 (¾ gr.) 66 (1 gr.) 100 (1½ gr.)	8.0 6.8 9.3	6.8 9.3 11.2	.. .. 11.4	......	..	..
5	6	33 (½ gr.) 50 (¾ gr.)	5.8 9.6	6.5 10.3	8.2 11.0	9.5 ..	9.6..	..
6	4	100 (1½ gr.) 200 (3 gr.)	6.0 8.1	.. ..	8.1 10.0	....	..	..
7	7	100 (1½ gr.)	7.8	..	10.1	..	..	..

copper is added to a milk diet, will give a response equal to 750 mg. (12 gr.) of iron in the form of iron and ammonium citrate. When slightly larger doses of ferrous iron are given a good response can be obtained, even if copper is not added.

In the case of older children with nutritional anemia the addition of copper was considered unnecessary, as they were receiving an ordinary diet which contained appreciable amounts of copper. The amounts of iron necessary to bring the hæmoglobin to 10 mg. per 100 c.c. varied considerably. It is evident from Table IV that to obtain a good response the dose need not exceed 200 mg., approximately 3 grs., of iron in the soluble ferrous state per day. Such doses of iron were always well tolerated by the children. No gastric discomfort or constipation complicated the medication. These results show that satisfactory responses followed the administration of small doses of ferrous chloride.

CONCLUSION

Ferrous chloride, 0.025 mg., together with copper, was as effective in curing nutritional anemia in rats on a milk diet as much larger doses of soluble ferric salts.

The feeding of 10 mg. (1/6 gr.) of ferrous iron daily in the form of soluble ferrous chloride to anæmic infants, was as effective as feeding 750 mg. (12 gr.) of iron in the form of iron and ammonium citrate, but neither form of medication produced an optimal response. The addition of copper to the 10 mg. of iron as soluble ferrous chloride per day or increasing the amount of this form to 33 or 40 mg. (1/2 to 2/3 gr.) daily gave a satisfactory response.

Small amounts of ferrous iron in the form of soluble ferrous chloride, 50 to 200 mg. (2/3 to 3 gr.) daily, were effective in curing the nutritional anemia in older children on an ordinary diet.

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Editorials

THE PROBLEM OF HIGH BLOOD PRESSURE

HIGH blood pressure is a problem of perennial interest. The condition would seem to be widespread, if the conversation of the laity at the social gathering and over the bridge table may be taken as a proof. It has always interested medical men. But, after years of study and research hypertension still remains an enigma. We know that it "runs in families", that it usually becomes obtrusive in the later decades of life, that it is commonly associated with acute and chronic nephritis and coarctation of the aorta, that it may accompany some of the hormonal diseases, that it may arise without obvious cause (essential hypertension) and that it may assume excessive proportions (malignant hypertension). We believe that the immediate cause is vasoconstriction, but why the vasoconstriction is the puzzle. So far there is no cure. We are content to recommend regulation of the diet, attention to the bowels, the avoidance of mental worry, a sufficiency of physical rest—in short, we advocate "the simple life".

The drug treatment is merely palliative. And so we remain.

The rise in the mean arterial pressure might, conceivably, be due to raised cardiac output or increased viscosity of the blood but these factors have been excluded by direct experiment. We fall back on the conceptions of vasostenosis and vasoconstriction, the latter a condition which, it would seem, affects the small arteries and arterioles (Ellis and Weiss¹; Oppenheimer and Prinzmetal²) and is probably more or less uniformly spread (Pickering³).

What is the nature of this vascular obstruction in hypertension? There are three possibilities, namely, a gross anatomical change in the walls of the arteries or a narrowing of their lumina due to spasm of

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2. OPPENHEIMER, E. T. AND PRINZMETAL, M.: Rôle of arteries in peripheral resistance of hypertension and related states, *Arch. Int. Med.*, 1937, 60: 772.
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a nervous or chemical nature. The first of these has been largely discounted through histological and clinical studies.* We are left with the nervous and chemical hypotheses.

We may admit at once that normal vascular tone is in part of nervous origin, as is shown by the vasodilatation that follows section of the sympathetic nerves and by the extreme fall in blood pressure that occurs when the spinal cord is destroyed. However, completely denervated vessels are not fully dilated, and, therefore, it is possible that normal vascular tone is partly also of chemical origin. Whichever of these factors is being considered we have in each case to show that the action of the nervous mechanism or of the chemical element is excessive.

It should be premised that the hypothesis of Hering (1927), supported by Regniers and Mies, to the effect that the raised blood pressure is due to interference with the carotid sinus and aortic reflexes is now discredited. A second hypothesis, that of Raab (1929), that essential hypertension is due to ischaemia of the medulla and consequent increased irritability of the vasomotor centre has been partly though not wholly controverted.

The chief evidence in favour of the nervous origin of hypertension is derived from the cold pressor test and the operation of dividing the sympathetic nerve supply to the abdominal viscera. In the case of the former the conclusions of Hines and Brown⁴ are not accepted by Pickering (*loc. cit.*) for the results of the procedure are not always the same.

The operations for denervating the splanchnic area, largely introduced by Adson and his colleagues, are of two kinds—section of the anterior spinal roots from about the sixth thoracic to the second lumbar, and section of the major and minor splanchnic nerves above or below the diaphragm with removal of the adjacent sympathetic ganglia.

* An exception to this general statement may be the deposit of lipoids in the intima in the case of diabetes, which is often associated with hypertension, that may almost completely obliterate the smaller vessels. See Cullinan, E. R. and Graham, F.: Atheroma and coronary thrombosis in a young diabetic, *J. Path. & Bact.*, 1934, **38**: 167.

4. HINES, E. A., JR. AND BROWN, G. E.: Standard stimulus for measuring vasomotor reactions, *et seq.*, *Proc. Mayo Clinic*, 1932, **7**: 332.

These two operations seem to produce similar effects on the arterial blood pressure in essential hypertension. In some patients the fall in blood pressure is profound and persistent, in most a considerable fall is eventually followed by a return to approximately the level before operation, and in a few the blood pressure is unaltered. Pickering remarks:—"From general considerations and from the effects of operations on normal dogs and on dogs with hypertension originating chemically from renal ischaemia we may interpret those results in which a variable post-operative fall is followed by a return to the pre-operative level of arterial as meaning no more than that normal vasomotor nervous tone has been removed from the splanchnic area. In those instances where the blood pressure returns permanently to normal this explanation may be insufficient." Further investigation is required to clear up this latter question.

The results of the various operations on the nerves are not uniform, and, at the moment, the evidence in favour of the nervous theory of hypertension is not convincing. We pass on, therefore, to the chemical theory.

Pickering lays down that in any organ the blood-flow is proportional to the perfusing pressure divided by the resistance offered by the vessels. In the case of persistent hypertension the blood-flow through the upper extremity seems to be normal, that is, the increased perfusing pressure is balanced by increased vascular resistance. This investigator devised a simple experiment to determine the degree of blood-flow. He used Stewart's calorimetric method on the hand as an index of the blood-flow, removing vasomotor nervous tone from the hand by raising the body temperature. He found that this method was entirely effective for the purpose. In the case of essential, malignant, and chronic nephritic hypertension he found normal blood-flows after removing vasomotor nervous tone. Similar experiments carried out by Prinzmetal and Wilson⁵ lead to the same conclusion. These results suggest that the controlling element in the production of increased peripheral

5. PRINZMETAL, M. AND WILSON, C.: Nature of peripheral resistance in arterial hypertension *et seq.*, *J. Clin. Investigation*, 1936, **15**: 63.

resistance is not nervous and, therefore, presumably chemical.

The problems involved in this conception are sufficiently intricate. Attempts have been made to discover some pressor substance in the blood in cases of essential hypertension but without convincing results. Pickering⁶ measured the changes of blood pressure induced in anæmic patients who are given blood from normal donors and from others with hypertension. Even when 600 c.c. of blood from a hypertensive donor were introduced no appreciable rises in blood pressure resulted. Prinzmetal, Friedman, and Rosenthal⁷ also found no pressor response even after the transfusion of as much as 2,300 c.c. of blood from a hypertensive donor. Pickering remarks that if a circulating pressor substance exists in benign and malignant hypertension it is present in surprisingly small quantities. This agent would also appear to be one which is relatively stable in the body and fixed by the vessels on which it acts. All the available evidence points to the kidney as the likely source of the offender.

It is well recognized by clinicians that chronic nephritis and hypertension are frequently associated. The association is most frequent in the case of the chronic interstitial and senile kidney. Which is primary, the hypertension or the renal change, in any given case is probably debatable. The point cannot be settled by the clinical course, as cases are only seen late, or by histological examination of the human kidney; experimentation on animals is the most promising way to get the clue, for only by this method can we hope to apprehend the sequence of events.

Much of the recent work on hypertension points in the one direction, namely, that circulatory disturbance in the kidney can

produce many of the features of hypertension. Goldblatt, Lynch, Hanzal and Summerville⁸ have shown that persistent hypertension, similar to that of man in that a relatively normal renal function is maintained, can be produced in dogs by constricting the renal arteries. Goldblatt,⁹ after severe constriction, observed albuminuric retinitis, arteriolar necroses and renal failure such as are found in the malignant hypertension of the human subject. Wilson and Pickering¹⁰ have also reported the production of widespread necrosing arteriolar lesions in rabbits by constriction of the renal artery. Corroborative evidence comes from France. Vallery-Radot and associates,¹¹ working on eight dogs, compressed the renal arteries after removal of the nerve supply to the kidney and concluded that arterial hypertension can result from this procedure. Finally, Moritz and Oldt¹² advance histological evidence suggesting that the primary lesion in essential hypertension is renal arteriosclerosis.

Can we conclude that essential and chronic nephritic hypertension in human beings are due to the release into the circulation of some chemical substance by the kidneys? Not yet, but the idea is alluring and will doubtless occupy the attention of investigators from now on. We already know, from Tigerstedt and Bergman,¹³ that a protein-like pressor substance is a normal constituent of the renal cortex.

A.G.N.

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AMENDMENTS TO THE FOOD AND DRUGS ACT

PERHAPS a medical man may be forgiven for thinking that the laws relating to health in any given country may be taken as an indication of that country's advancement in intelligence! It is usually possible in a country like Canada to put into effect reasonable health measures without compulsion from the state. Certainly the general public, at least in Canada and the United States, is becoming more and more health-minded (a situation not without its drawbacks, it may be noted!). It is somewhat different when it comes to the question of foods and drugs. Here the public is more apt to be credulous, and needs to be protected against itself. It is particularly gratifying, therefore, to find that Canada has been applying itself anew to the problems involved in the production and handling of these articles.

The manufacture and sale of drugs has been regulated in Canada by two statutes in particular: the Food and Drugs Act (Revised Statutes of Canada, 1927, chap. 76) and the Proprietary or Patent Medicine Act (R.S.C., 1927, chap. 151). By the Food and Drugs Act power is given to the Governor-in-Council to make regulations prescribing standards of quality and requiring that labels contain sufficient information to prevent deception. Provisions will be found in it on the adulteration, misbranding, and analysis of drugs. The Proprietary or Patent Medicine Act, as its name implies, relates only to patent medicines. Every manufacturer of a patent medicine is required to register with the Minister of Health, and, in addition, to take out an annual licence before selling his product. The Act provides for the labelling of the drugs covered by it and forbids the sale of any patent medicine falling within certain specified classes. For instance, it is stated that no patent medicine shall be manufactured, imported, exposed or offered for sale in Canada which is represented as a "cure" for any disease. A schedule to the statute lists thirty-one drugs none of which can be an ingredient of a patent medicine unless its name and the amount of each dose is conspicuously printed on an inseparable part of the box and wrapper, or if the quantity of the drug

exceeds the amount specified by the Advisory Board.

A certain amount of confusion arose between the Food and Drugs Act and the Proprietary or Patent Medicine Act, and in 1934 the former statute was amended in an important respect. In that year a schedule was added to the Food and Drugs Act listing thirty-six diseases, or rather groups of diseases, and the importation or sale of any remedy represented to the general public as a treatment for any of these thirty-six groups was forbidden.

We are greatly indebted to Dr. J. J. Heagerty, of the Department of Pensions and National Health, Ottawa, for information as to the purpose and scope of the latest amendment to the Food and Drugs Act. Bill 13, An Act to amend the Food and Drugs Act, introduced at the present session of Parliament, received the royal assent on April 5th, and will have the force of law when proclaimed. For some time it has been evident to the Department that changes in the original statute were necessary if it was to be efficiently and effectively administered. They have not been precipitate about amending it, however, and the present Bill, based upon the Department's long experience, appears to be judiciously conceived and carefully expressed.

In general terms it may be said that the purpose of the amending Act is to enlarge the scope of the existing Food and Drugs Act so as to increase its usefulness. The definition of the term "drug" is broadened to include surgical suture materials such as catgut, bandages, sponges, gauze and drainage tubes, such biological materials as are sometimes employed for diagnostic purposes, cosmetics, disinfectants or insecticides capable of being used in premises where food is manufactured. It will now be possible, therefore, for the Department of Health at Ottawa to regulate henceforth the manufacture, sale and advertising of these articles as well as of medicine for the internal or external use for man or animal to which its control was formerly restricted.

A most commendable innovation is the inclusion of cosmetics within the scope of the Act. This has for long been highly

desirable. The reasons for such action are clearly indicated by Doctor Heagerty, from whose communication we quote verbatim. "Cosmetics are marketed for a great variety of uses. They comprise creams, depilatories, shaving creams, hair dyes, eyelash and eyebrow dyes, nail polishes, lipsticks, rouges, skin astringents, shampoos and tooth pastes. These have been known to contain substances that are injurious. Depilatory creams have contained thallium acetate, which has been known to cause death, or sulphide in excessive quantity, which has caused skin burn and rashes. The use of hair dyes and eyebrow and eyelash dyes containing paraphenylenediamine, which was originally used for dyeing rabbit skins, has been followed by blindness and death. Preparations are being marketed to make the eyes sparkle, and these should be brought under control. Nail-polishes may contain injurious substances which not only discolour but may prove injurious to the finger nails. Rouges are known to contain aniline dyes that are injurious. Lipsticks contain mercurochrome, to give a permanent colour. Skin astringents are marketed for removing the outer layer of the skin to make it appear more youthful. Some of these contain as their chief ingredient carbolic acid in strong solution. Dry shampoos for the scalp have as their chief ingredient carbon tetrachloride, commonly used for cleaning clothes. This preparation is quite toxic. Tooth pastes are known to contain injurious substances, and, if medicinal claims are not made, there is no control over them. Recently, application was made under the Proprietary or Patent Medicine Act for registration of a tooth paste containing lead. This was, of course, refused. Facial creams are being advertised as containing vitamin D. While the vitamin D may be absorbed its action on the skin is exactly nil." All of which is a sufficient indictment.

One of the purposes of the Food and Drugs Act is to prevent the purchasing public from being deceived by statements as to the character, strength, quality or quantity of any food or drug that may appear upon the label or package. The 1939 amendment tightens up the provisions of the original statute in this respect. Where the original Act has authorized the Governor-in-Council

to make regulations requiring a label to be attached to any article of food or drug designed to protect the public from deception, the amendment authorizes the making of regulations generally with respect to packaging and labelling any food or drug and the design of any package or label. Under the Act as now amended, therefore, the Department will be enabled to prevent the kind of deception that often results by implication from the manner in which a package is designed. The penalty sections of the Act are likewise amended so that misrepresentation by device rather than by statement can be punished.

A further weapon has been placed in the hands of the Department of Pensions and National Health by the addition of subsections (j) and (k) to section 3 of the Act. Under the first the Governor-in-Council may make regulations providing for the licensing of manufacturers of cosmetics, "specifying such terms and conditions as may be deemed advisable in the public interest". Under the second regulations may be made "prohibiting the sale or defining the conditions of sale of any substance which may be injurious to health when used as a food or drug or restricting in like manner its use as an ingredient in the manufacture of food or drug". Both subsections were amended when the Bill was being considered in the Committee of the House. Words were added to subsection (j) making it clear that manufacturers of cosmetics must procure a licence, whether or not they carry on business as such in Canada, the purpose of the amendment being to require a licence of foreign manufacturers before they sell their products in Canada. As to subsection (k), some concern was expressed in the Committee that too great discretionary powers were being given to the Department. In consequence, the words "which may be injurious to health when used" were added to the Bill.

The 1939 amendments to the Food and Drugs Act will come into effect when proclaimed. The Department at last has very complete control over the manufacture and sale of food, drugs and cosmetics, and the opinion has been expressed by competent authority that this Canadian law, as now constituted, is in advance of that of any other country.

A.G.N.

Editorial Comments

Sulphapyridine and its Synonyms

It is not often that a drug is referred to by more than one name, still less by three. The numerous papers occasioned by the newest sulphanilamide derivative contain no less than three terms commonly used for the same substance; they are, "M. & B. 693"; "dagenan"; and "sulphapyridine". The chemical name is on record but is seldom used.

We have no intention of passing judgment on the comparative propriety of these names, but in view of some inquiries that have reached us we wish to point out that they all mean exactly the same thing. Each of them, as is natural, has some special association with the drug. M. & B. stands for Messrs. May and Baker, the British firm who discovered the drug, and the number shows its place in the long list of substances previously experimented with. Dagenan embodies the name of the town in England at which the substance was first prepared, namely, Dagenham, Essex. Sulphapyridine is the non-proprietary name adopted by the Council on Pharmacy and Chemistry of the American Medical Association. It is a convenient and accurate abbreviation of a hopelessly unwieldy chemical formula.

H.E.M.

The Medical Press and Circular, 1839-1939

Not many of our present medical journals have been in existence for a hundred years. Those which have survived so long are worthy of note. How have they done it? Why have not more survived? The *Medical Press and Circular* is to be congratulated on its centenary, but still we ask how they have managed it. The last hundred years are full of the skeletons of medical journals. Their high mortality makes an interesting study, but the secret of the longevity of the few is just as interesting. One might suppose it lay in the impetuous vigour with which they attacked abuses, but that exuberance was not equally evident. The *Lancet* certainly had it, and the *Medical Press* also, but others did not, and still they flourished.

No, there must be something more than vigour of spirit. Is it the editor himself who makes the difference? Not entirely, although his personality is probably the biggest single factor. And yet even amongst our small group of Canadian journals we have had editors of outstanding ability: Archibald Hall, of the *British American Journal* (Montreal, 1845); F. Fulton of the *Canada Lancet* (Toronto, 1868); Sir Andrew Macphail and A. D. Blackader, who have left their abiding mark on our own *Journal*; and there are others on this continent and elsewhere. But there are no Canadian centenarians, and few American.

Two of these long-lived journals (the *Lancet* and the *Medical Press*) share one thing in common. Both of them have been edited for more than half of their existence by members of the same family; the *Lancet* for nearly 87 years by Thomas Wakley and his family, and the *Medical Press* for 62 years by Arthur Jacob and his son. The editor of the *Lancet* expresses this fellow-feeling in a delightful foreword to the special volume celebrating the centenary of the *Medical Press*; he says,

"The *Dublin Medical Press* (as it then was) and *Lancet* may well take pleasure in having manifested in their youth an exuberance of spirit which enabled them to stay the course. Neither need feel abashed at a youthful intransigence which arose primarily from two worthy emotions. In each case the essence of childhood—the broth of the boy in the strict sense of the words—was a consuming passion for the rights of medicine and an envy of those who stood in the way of these rights."

After this kindly expression of good humour, it is amusing to turn back to some of the exchanges between the two Journals in their early days; here is an example of exuberance:

"We need hardly say", remarks the editor of the *Circular* on one occasion, referring to something in the *Lancet*, "that this notice is characterized by the usual grossness of that Editor's invective, and that its mendacity is only rivalled by the artfulness with which it is designed and concealed. There are some animals that are never so happy as when rolling in slime, and it is obvious that the Editor of this literary kennel has qualities in common with the porcine family."

We live in suaver times, as the foreword puts it, and it is much better so, but if the warmth of feeling of the older journals was apt to become excessive at times it at least helped to keep them alive. We may not have the whole secret of their longevity, but we can always emulate their unwavering struggle to maintain high standards in the profession.

H.E.M.

Our Visitors from Britain

We have received word that Dr. Edward Provan Cathcart, Regius Professor of Physiology, and Director of the Institute of Physiology, The University, Glasgow, Scotland, will give his trans-Canada broadcast on the evening of Tuesday, June 20th, from 7.00 to 7.15 p.m. E.D.S.T. The broadcast will originate in Montreal.

His public address will be given at the Ritz-Carlton Hotel at 8.30 p.m. on June 19th. The subject will be "Food and nutrition".

Sir Arthur MacNalty, Chief Medical Officer of the Ministry of Health for Great Britain, London, will, we hope, be the guest-speaker at the luncheon on Tuesday, June 20th at 12.30 p.m.

Special Article

DIET AND NUTRITION

PROPER FEEDING AND GOOD HEALTH*

By SIR EDWARD MELLANBY, K.C.B., M.D.,

F.R.S., K.H.P.

London, Eng.

XVI.

I am glad to have this opportunity of broadcasting to the people of Canada a simple statement concerning the great modern movement to improve the physique and prevent ill-health by proper feeding. As a preventive measure against ill-health, it compares in promise with the magnificent movement in sanitation started about 1860; and, just as Great Britain led the world in that public enterprise, so also must the British Commonwealth of Nations lead in the present movement for improved nutrition. Canadian people are reputed to be among the best fed nations in the world. From my own limited observations I should say this is true: you certainly have at hand, in your large towns at least, a wonderful range of the finest food-stuffs, and there is also evidence of a sense of health consciousness in your restaurants and homes. Superficial observation also suggests to me that your nutritional condition is, in some respects at least, better than in England. For instance, you seem to me to have much better teeth and straighter legs. There is, however, no doubt that improved dietary habits in Canada, especially in the rising generation, would result in better physical and mental health, the disappearance of much sickness and physical disability, and a great reduction in the need for doctors and hospitals. Prevention of disease is infinitely better than any dramatic cure. Let us now examine this question.

Diet must be considered from two points of view, one of less importance as a practical issue because it is guided by natural instincts, and the second of much greater importance because it can only be controlled by knowledge and intelligence. The first concerns the amount of food eaten. A person must have sufficient (but not too much) food to eat, because he or she is like a steam or any other kind of engine and requires the energy supplied by the combustion of food or fuel to provide the amount expended in movement and for the maintenance of the body temperature. If he eats too little he will lose weight and ultimately die of wasting and starva-

tion; if he eats too much he will either get indigestion or become obese. The feeling of hunger and repletion and other bodily reactions are good safeguards in determining the right amount of food to be eaten.

When, however, we consider the quality of the food in dietary, matters are entirely different. Instinct is a poor and often a bad guide, and yet this and purchasing power controls for most people the choice of dietary ingredients. The result is that the bulk of the diet is made up of the cheaper foods—cereals like flour, rice and oatmeal, vegetable oils and lard, also sugar, jam, lean meat, pork and pulses. These foods are deficient in practically all the vitamins and in certain mineral elements, especially calcium. Nor are these deficiencies of vitamins and minerals elements made good by the large consumption of the common beverages—coffee, tea, mineral waters, beer and spirits.

There is, however, another series of foods, known as protective foods, which as a group are rich in these substances essential for life and good health. If a sufficiency of these protective foods is not eaten poor physical development and certain forms of ill health result. Protective foods include milk, butter, cheese, eggs (especially the yolk), vegetables (especially green vegetables), liver and other glandular organs, fat fish, such as salmon, herring and mackerel, fish oils (for example, cod liver oil) and fresh fruit. The most important and best of all these protective foods is milk, because it is rich in practically all the factors essential for health and good physique. Milk added to any diet improves it greatly.

The first important principle of good dietary is that the greater the relative amount of protective foods, as compared with the energy-giving foods, eaten by a community, the better is the physique and standard of health. This does not mean that cereals and other members of the energy-giving foods should be excluded from the diet, but only that they should not be allowed to form anything like the largest part (about 60 per cent in England) of the total dietary. Generally speaking, so far as town life is concerned, the poorer the people, the greater is the amount of cereal and other foods of this group eaten and the worse the standard of health and physical condition.

The second great principle of dietary is that the younger the person, the more important is it that the proportion of protective foods should be greater. It is appalling to be told, as a doctor is so often told by a mother, in answer to a question as to the feeding of children of two or three years of age that "they get what we get".

* A nation-wide broadcast, September 29, 1938.

This is the sixteenth in the series of articles on Diet and Nutrition prepared under the auspices of the Association's Committee on Nutrition. The previous articles can be found in the *Journal* 1938, **38**: 277, 387, 491, 586; **39**: 76, 179, 280, 389, 483, 578; 1939, **40**: 77, 174, 282, 393, 491.

The habit of giving children tea, coffee and cocoa is wrong. The normal drink of all infants and children ought to be milk, a bacteriologically safe milk containing 3 to 3.5 per cent of fat, not milk rich in cream, which often upsets them. Moreover, the modern mother ought to know that breast-feeding is much better for herself and even more for the infant than any form of artificial feeding. Statistics have conclusively shown that the death rate among artificially-fed infants is much higher than among breast-fed infants. Mothers would also be saved a great deal of trouble and anxiety if they gave their infants, even breast-fed, from the day of birth, a little cod liver oil (say a small teaspoonful). All breeders of dogs and poultry know this trick and how much loss it saves them, and it is high time all mothers knew and practised it.

Right up to the end of adolescence the daily milk intake ought not to be less than one pint, and two pints would be much better. Those in authority over children and over boys and girls living in institutions should see to this. Tissues are growing rapidly at this time and require plenty of available bricks, best supplied by milk, for this construction. The bones especially need an abundance of calcium and, if they do not get it, become imperfectly hardened, producing in infants and young children rickets with deformed bones and, in those older, bones which easily fracture; the teeth also are badly formed and more liable to decay. The teeth of civilized man are probably his greatest curse; milk, egg yolk and cod liver oil will help to produce good teeth and to prevent dental decay; too much bread and other cereal foods and sugar hasten its onset.

Statistics show that more eggs are eaten per head of population in Canada than in almost any other country. This is excellent. Egg yolk is a fine protective food, being rich in most of the vitamins and a good source of calcium and iron. Egg yolk, vegetables, meat and lightly milled cereals provide iron to the body and prevent anaemia. The great value of sea fish is that it is the only natural food rich in iodine, and, by virtue of this, prevents simple goitre when given to the growing child and adolescent. Cod liver oil is also valuable for this purpose. In a country like Canada where large numbers of people live a long way from the sea and goitre may be common this fact is of greater importance.

It is difficult to lecture the adult on his food. At this stage of life eating is one of the joys of existence, and he generally prefers, so long as he is feeling well, to eat what gives him pleasure rather than what is good for him. He would be well advised, however, to follow the general principles enunciated previously—to include a pint of milk in his daily diet and to look with favour on eggs, green vegetables and other protective foods. He would then be a much fitter person and his days of chronic ill

health, which come ultimately to most of us, would be delayed. Some people avoid milk because they say it makes them fat. So it does, if it is ingested simply as a drink like water with no food value. Milk has, of course, a high energy and food value apart from its vitamins and salts. It ought to *replace* some of the bread, sugar or other energy-bearing foods such as cakes, biscuits and chocolate, or even beer and whiskey. With well-to-do persons over 40 living a sedentary existence milk might well replace two of the three lots of meat of all kinds they commonly indulge in daily.

There is one type of adult who demands special attention, namely, the pregnant and nursing woman. Her food has to supply not only her own body needs but also the material for the growth of her offspring in the uterus during pregnancy and for the milk supplied to the infant during lactation. If she does not get a good supply of protective foods to sustain her the drain on her reserves of certain chemical substances ultimately brings about ill health. She becomes listless, tired and anæmic, some of her teeth decay, and she suffers from cramps, restlessness and sleeplessness. Ill health during pregnancy is far too common. As a natural physiological process it ought to be compatible with good health. To reduce or avoid ill-health the pregnant and lactating woman ought to include in her diet two pints of milk daily throughout pregnancy and eat plenty of green and other vegetables, some fresh fruit, the yolk of one or two eggs daily, meat once a day, sea-fish about twice a week and a little cod liver oil daily (say a teaspoonful) if she can take it.

A few additional points may be mentioned. Most vitamins are resistant to reasonable heat, and, therefore, the cooking of food does not greatly spoil its vitamin content. Exceptions to this statement are fruit and vegetables, which on cooking lose, in most cases, their vitamin C. Potatoes are an excellent food, and have a number of advantages over cereals, so that they can well be used as a substitute for bread, especially in the case of children. Milk is much better than the butter which is made from it. Butter has some excellent qualities, but has lost many of the valuable constituents of milk itself.

You may have noted that I have not made any mention of vitamin concentrates now so abundant on the market and so extensively advertised. In ordinary health they are unnecessary, as a sufficiency of vitamins can be obtained from the foods mentioned.

Complexity of dietary is not needed for the maintenance of good health. Some communities living on the simplest dietary are the healthiest in the world. Take, for instance, the inhabitants of Tristan da Cunha, a small community living on an island in the South Atlantic. Here, until recently, when a small

amount of flour has been imported, there was no bread or other cereal to eat; all the infants were breast-fed for long periods, and the main articles of diet were milk, mutton, fish, eggs and potatoes. There is no rheumatism or arthritis on the island, and there is no rickets; the teeth are almost free from decay and incomparably better than in Canada, and there has never been a death in childbirth. Similar, but not identical, conditions used to hold in the Western Hebrides and Labrador, but the advance of so-called civilization and especially the easier access to our own articles of diet, including white flour and sugar, have changed all this. In the island of Lewis it was recently found that the further away the people were from a store, that is to say, the more they had to depend for sustenance on the natural produce of the sea and land, the better teeth they had.

Finally it must be remembered that a good deal of bodily discomfort and ill health is due to overfeeding. The fat person is physically unfit. He is the right person to slim. On the other hand, the girl or young woman who slims consistently is looking for trouble, and the high death rate due to tuberculosis at this age will only be reduced when her feeding habits are healthy and she leads an active physical life.

These, then, are the simple teachings of modern nutrition. Parents and others controlling the diet of young people, in whose hands the future lies, may or may not make use of the new knowledge for themselves, but they ought at least to see that their offspring and the rising generation get a chance, the only chance, of attaining a far better state of physical and mental development and health than they themselves possess. For, whatever any government can do, the solution of this problem lies ultimately in the hands of the individual members of the community. Public authorities can certainly direct their agricultural and economic policies so as to increase the supplies of protective foods, reduce their cost, and even supply some free of charge or at specially cheap rates to the more indigent. None of these actions, however, is sufficient unless the public choose to eat the health-giving foods. It is the purpose of this brief statement to explain why people should consume greater quantities of the protective foods, especially during the earlier years of life, and to assure the public of the benefits to health that would follow. The subject of diet and its relation to good nutrition and health is beset by faddism and quackery and tends to be discredited. What I have attempted to tell you now is not faddism but is based on the results of modern scientific investigation.

Medical Economics

CANADIAN EXPERIMENTS IN MEDICAL ECONOMICS*

By T. C. ROUTLEY, M.D., LL.D., F.R.C.P.(C.)

*General Secretary, Canadian Medical Association,
Toronto*

(After some introductory remarks on the changing aspect of medical practice, Dr. Routley continued.)

Medical economics has been defined as, "The science that investigates the conditions and laws affecting the production, distribution, consumption and cost of the various types and kinds of medical services that promote and preserve the health of the people". If we may accept this definition as one which broadly covers the subject it will be seen that the medical profession has every right and, indeed, every obligation, to investigate and define the conditions and laws which have to do with the various types of medical service to which the public are entitled, looking to the preservation of the health of the people at the optimum level. Speaking for myself, I am not willing to admit for one moment that the medical profession as a body is in-

competent to determine how best the public shall be served. On the contrary, it is my firm belief that, given the opportunity to act in a corporate manner, the medical profession is equal to any task which properly comes under its purview. I say advisedly that we are equal to the task, but I think one should be just as emphatic in saying that we are only equal in so far as we are willing to assume the task. What is the task? Briefly put, I think it is this: to provide adequate medical care for all the people at a price which is fair to all the people, including those who render the service. That is our task. Is it? Well, if it is not *our* task it certainly belongs to somebody, because the public has a right to demand medical services at a price within its competency to pay; and if we should prove ourselves unwilling or unable to organize on a basis to meet the public's proper demands then we deserve to become enmeshed in plans not of our making or choosing.

If I interpret correctly the attitude of the American Medical Association, which represents a very large section of medical opinion in the United States, I would say that you have affirmed over and over again your willingness and indeed your anxiety to do all in your power to see to it that no citizen of your country is deprived of medical care, no matter what his financial station may be. Organized medicine in Canada has

*An address, somewhat abbreviated here, given at the 35th Annual Congress on Medical Education and Licensure, Chicago, February 13, 1939

taken a similar stand, and yet there are people both in your country and mine, who, for reasons best known to themselves, appear to get some vicarious pleasure out of assailing the medical profession and questioning its sincerity when it says these things.

Admitting, if we may, that there is an urge on the part of great masses of the public for some change to be brought about in medical practice, how best may we proceed to study the merits of the case, if merit there be? Accuracy is often born of trial and error. It is my view that we should accept all reasonable opportunities to demonstrate by trial, and possibly by errors too, well conceived plans where groups of persons may receive medical care; but the all-important consideration is this,—*the plans should be devised, worked out, and put into operation with the fullest collaboration of the medical profession.* Keeping this thought in mind, I wish to present to you the attitude of the Canadian Medical Association with regard to the subject under discussion, and outline as concisely as possible some Canadian experiments in the field of medical economics.

As you well know, many persons hold to the belief that state medicine or health insurance or some modification of one or both, governmentally applied, is the answer to the whole problem. We as a profession know equally well that that is far from the truth. We do know that state medicine or health insurance, partially or wholly under government control, is in effect in forty countries. It has been my privilege to visit many of those countries and to study the vast majority of health insurance plans now in operation throughout the world. I say with all confidence that I do not know of one scheme or plan now in effect in any country that I would wish to see introduced into Canada.

The Canadian Medical Association has not authorized an expression of opinion either in favour of or opposed to the institution of health insurance in Canada; as our legal friends would say, the matter is still *sub judice*. But, in the event of some plan being proposed from outside the profession, which in actual experience has already occurred, the Association has set forth what it believes to be necessary guiding principles by which it can carefully scrutinize and measure all such plans as are advanced. May I now present these principles:

1. That, in the provinces where health insurance is established it be administered under an independent health insurance Commission, and that there should be close cooperation between this Commission and the Provincial department of public health, with a view to making full use of preventive services.

2. That a central health insurance board and local insurance boards be appointed, representative of all interested, to advise the responsible administrative authority.

3. That the professional side of health insurance medical service be the responsibility of the organized medical profession through the appointment of a central medical services committee and local medical services committees, to consider and advise on all questions affecting the administration of the medical benefit.

4. That the question of the establishment of local areas for health insurance administration be left to the decision of the individual provinces.

5. That the whole province be served by adequate departments of public health, organized on the basis of provision of individual health-supervision by the health insurance general practitioner.

6. That there be a health insurance fund and that "regional medical officers", to act as supervisors and referees, be appointed, paid and controlled by the central board or commission.

7. That medical care for indigents be provided under the plan, the Government to pay the premium of the indigents, who then receive medical care under exactly the same conditions as the insured person.

8. That the plan be compulsory for persons having an annual income below a level which upon investigation by competent local authorities proves to be insufficient to meet the costs of adequate medical care.

9. That the dependents of insured persons be eligible for the medical benefit.

10. That there be offered, on a voluntary basis, to those with incomes above the health insurance level, hospital care insurance, and that this be administered as part of the health insurance plan, such hospital care not to include medical service other than hospitalization.

11. That the only benefit under the plan be the medical benefit.

12. That the medical benefit be organized as follows:

- (a) Every qualified licensed medical practitioner to be eligible to practise under the plan.

- (b) The insured person to have freedom of choice of medical practitioner and vice versa.

- (c) The medical service to be based upon making available to all a general practitioner service for health supervision and the treatment of disease.

- (d) Additional services to be secured *ordinarily* through the medical practitioner:

1. (a) Specialist medical service.

- (b) Consultant medical service.

2. Visiting nurse service (in the home).

3. Hospital care.

4. Auxiliary services—usually in hospital.

5. Pharmaceutical service.

- (e) Dental service, arranged direct with dentist or upon reference.

13. That the Insurance Fund should receive contributions from the insured, the employer of the insured, and the Government.

14. That the medical practitioners of each province be remunerated according to the method or methods of payment which they select.

15. (a) That the schedule of fees in any health insurance scheme shall be the schedule of fees accepted by the organized profession in the province concerned.

- (b) That all schedules of fees be under complete control of the organized medical profession in each province.

16. That the contract-salary service be limited to areas with a population insufficient to maintain a general practitioner in the area without additional support from the Insurance Fund.

17. That no economic barrier be imposed between doctor and patient.

18. That the volume of work demanded from and the remuneration to members of the various professions be such as to assure a standard of service equal to or better than present-day standards.

Does the setting forth of health insurance principles act as an invitation for health insurance legislation? The Canadian Medical

Association takes the view that if Governments, National or Provincial, should take it upon themselves to introduce legislation of a medico-economic nature, we, the medical profession, should know in advance where we stand, and under what conditions we would be willing to cooperate. We believe that a definition of policy predicated upon sound thinking, and keeping a proper balance between medical ideals and medical practice, is desirable, and, therefore, after several years of study and discussion within our component parts these principles emerged upon which we believe we may safely rest our case, and, if necessary, base our willingness to negotiate.

It would not seem out of place to say, at this juncture, that the best conceived and executed plan which can be devised for adequate medical care for all the people, including the poor and needy, is but a poor stop-gap for those in the lowest income group if, at the same time, nothing is done to try and provide work and wages and a decent standard of living for these people. It would seem to me that this is a field of thought and endeavour to which some well-intentioned observers and social workers might give heed by way of diversion from their favourite pastime of assailing the medical profession for its alleged inability or unwillingness to provide adequate medical care for all the people.

One of the major Canadian experiments in medical economics, although the experiment might be regarded so far as having come to naught, occurred in British Columbia. So much attention has been directed to this experiment that I now propose to give you the high lights of it as they concern the medical profession.

HEALTH INSURANCE IN BRITISH COLUMBIA

As far back as twenty years ago, in March, 1919, to be exact, the Government of British Columbia appointed a select committee to inquire as to laws relating to the subject of mothers' pensions, maternity insurance, health insurance and public health nursing which are in force in other countries. Ten years later, in 1929, the Government appointed a Royal Commission to inquire into all matters affecting maternity benefits and health insurance. In 1932 this Commission reported and recommended the "early establishment in British Columbia of a suitable health insurance plan including maternity benefits". Nothing further was done until 1935, when the Government issued a draft of a plan of health insurance. This draft bill was sent broadcast throughout the Province. The public was asked to study it. Then there followed the setting-up of a Public Hearings Committee, to receive expressions of opinion from public bodies, including the medical profession. Some of the points, both favourable and unfavourable, in the original draft bill which are of interest to the medical profession follow.

1. The medical profession became aware of its provisions when the Bill became public property.

2. It included cash benefits, which do not belong in a health insurance measure.

3. It included the indigent for whom medical services were to be paid for by the Government.

4. It provided for the insured a complete medical service with hospitalization, nursing and dental services.

5. It included all employees earning \$2,400 a year or less, and also their dependents.

6. There was to be paid for complete medical services, including hospitalization, nursing and dental services, not less than \$10.00 and not more than \$13.20 per insured person per year, plus a sum of 5 per cent of the total annual expenditures on medical benefits for services of a general character.

7. The Health Insurance Fund was to be formed by (a) collecting from the employer 2 per cent of his pay roll applicable to insured persons; (b) collecting from the employee 3 per cent of his wages; (c) a contribution by the Government of sufficient funds to cover the cost of medical benefits provided for indigents, plus half the cost of administration "provided that the contribution of the Province shall not be greater than \$1,200,000 in any one year".

The reaction of labour to the draft bill was on the whole favourable, although there was some objection to the 3 per cent levy on wages; and a certain number urged that the upper income limit of \$2,400 per year should be removed entirely. Industry protested that economic conditions in the Province were such that it could not meet the additional tax which would be levied. The medical profession, while objecting specifically to a number of the provisions in the bill (reference to which will be made later), strongly urged that before any such legislation were enacted a more intensive study should be made not only in British Columbia but throughout Canada as a whole, as to the need for legislation of this character.

In the spring of 1936 the British Columbia legislature presented a radically altered bill, practically all the alterations being, in the opinion of the medical profession, of a retrograde character. Here are some of them.

1. The Government agreed to advance \$50,000 for organization purposes, and there its financial responsibility ceased; obviously an actuarially undetermined piece of financing.

2. The indigent was excluded, with no alternative provision being made for him or his dependents outside the Act. In other words, the indigent was left on the doctor's doorstep.

3. Many classes of low-wage earners were excluded, including casual labourers, domestic servants, farm labourers and all employees earning \$10.00 a week or less.

4. Old age-pensioners and widows' pensioners were excluded from the benefits.

5. Contributions to the fund were greatly reduced—from the employer, 2 per cent instead of 3 per cent; from the employee, 1 per cent instead of 2 per cent; a reduction in funds that made the Act still further actuarially questionable.

6. A complete medical service was still to be provided, including hospitalization and one-half of the drug bill, although the financial basis had been gravely lowered.

7. Remuneration of the medical profession was to be "at the rate of not less than \$4.50 per annum per insured person eligible to receive benefits".

From a medical point of view the Act was clearly undesirable and unacceptable.

Although the party in power regarded the Act as a Government measure, it had a stormy passage through the legislature, finally emerging on March 31, 1936, to become effective on a date to be fixed by proclamation. Following the passing of the Act a health insurance commission was appointed, with very wide powers. The commission invited the medical profession to assist in working out details which would be satisfactory to both sides. Realizing that the legislature had spoken, the medical profession had no option but to attempt to make the best of the situation, but, finally, after many conferences, the committee representing the medical profession advised the commission that they could not accept the provisions of the Act or work under it. It was decided to ask the entire medical profession to vote upon the subject. When the ballots were counted it was disclosed that 622 doctors had voted against accepting the scheme while 13 had voted in favour. Furthermore, the medical profession announced in the public press that it could not undertake to provide medical services under the Act, and, on February 19, 1936, the Premier of the Province announced the postponement of the operation of the Health Insurance Act *sine die*. Three years have passed and the Act remains inoperative. From the point of view of the medical profession certain facts stand out and definite conclusions may be drawn from the above citation.

1. The Provincial Government failed to secure the approval of the medical profession to the medical provisions incorporated in its Health Insurance Act. This was a grave error, because not only must the cooperation of the medical profession be obtained before any such Act can be operated successfully, but a government, if it is to frame a satisfactory Act, should consult the medical profession at the outset, and, to a large degree, be guided by medical advice. It is the right of the medical profession to be consulted, and it should stand by that right.

2. A complete health insurance plan costs money, and no such plan will be successful if attempted on a financial shoe-string; further, no

scheme will be satisfactory or complete that does not (a) adequately remunerate those rendering service; (b) make provision for the indigent, old age pensioners, and all low-wage earners who are unable to provide medical services for themselves.

British Columbia is a Division of the Canadian Medical Association, and the fight of the doctors in that Province for economic justice and security was a fight in which the doctors throughout Canada felt themselves to be engaged. Consequently, the Canadian Medical Association whole-heartedly supported the medical profession of British Columbia in the stand which it took. It is our firm conviction that the hope of the medical profession for fair treatment in any country must to a large degree, rest in the organized medical profession whose interests are neither selfish nor parochial, but public-spirited in the broadest sense of the term. Let us turn now to quite a different picture.

THE MUNICIPAL DOCTOR SCHEME

During the past twenty-five years a plan has been developed in the Province of Saskatchewan which is known as the "municipal doctor scheme". The story of the beginning and growth of this plan is the story of the origin of a unique system of socialized medicine which has served a definite purpose in providing medical services which, it is alleged, could not easily have been obtained on the then prevalent basis of private practice.

For the purpose of local government, the Province is divided into geographical units of from six to twelve townships, each township being an area six miles square. Units are authorized to fix a mill rate of taxation for the provision of medical services. In 1914 one of these rural municipalities had practically no crop, and the local doctor was faced with the discouraging prospect of looking for a new field of endeavour, or, as he viewed it, staying to starve. The municipality assumed the responsibility of taxation and guaranteed him \$1,500 for one year if he would stay. He did so and thus began the scheme which today includes 121 doctors, being 20 per cent of the 600 practising physicians in the Province, who are engaged either whole time or part time as municipal physicians. In 1919 legislation was enacted whereby a rural municipality might engage a physician on a salary not exceeding \$5,000 a year. In 1930 legislation permitted this salary to be increased to \$5,500 in some of the larger municipalities. In 1933 towns and villages in the Province were extended similar taxing privileges, permitting them to engage physicians on a salary basis. In the main the contracts call for the provision of general medical services to include minor surgery, maternity care, medical health inspection, and immunization of school children. Practically all the contracts exclude major surgery.

An analysis of this service brings out the following points with respect to remuneration for services rendered:

In a large group of municipalities a capitation fee of as low as \$1.24 to as high as \$3.66 provides general medical services to a total of 77,421 persons for \$147,798.00, at an average per capita rate of \$1.94 per year. In another group of 13 municipalities, including 116 townships, a capitation fee from \$1.29 to \$2.81 provides, in addition to general medical services, major surgery within the competency of the municipal physician to render, to a total of 30,964 persons for \$59,050, or an average per capita rate of \$1.91 per year. In a third group of municipalities the capitation basis varies from 92 cents to \$3.32 per year. A total of 34,276 persons pay a basic salary of \$39,630, or a capitation rate averaging \$1.74 per year.

One observer, who has had an excellent opportunity to appraise the service, has provided me with the following information.

Points in favour of the Plan:—

1. A medical service is provided where otherwise there might have been none.
2. Pioneers who are developing the country have been guaranteed medical care much to the advantage of the country as a whole.
3. The doctor is guaranteed a certain definite income from which he can budget.
4. The plan tends to promote preventive medicine, in that it is to the doctor's advantage to keep his people well.

Points against the Plan:—

1. It interferes with private practice in some areas.
2. It interferes with free choice of physician.
3. In many instances there is too much work for any one man to undertake.
4. The pay, although a burden on the municipality, is in the majority of instances, inadequate for the work done.
5. Very few municipal doctors find time for post-graduate work or vacations.
6. A municipality is not a satisfactory unit for payment.
7. The doctor has no way of exacting remuneration from the municipality.
8. The scheme lends itself to doctors bidding against one another for positions.
9. Municipalities on occasion allow a contract with a doctor to lapse, perhaps owing him considerable money, and then advertise for another incumbent.
10. The municipality may arbitrarily cut salaries and the doctor can take it or leave it.
11. The doctor has no guarantee of tenure of office, and, therefore, little protection such as would prompt him to buy property.
12. Arrears of salary in some instances exceed \$10,000, with little prospect of their being paid.

Here follows a breakdown of one contract:—

Area covered.....	350 square miles
Population.....	2,800
Work done for the year 1936:	
Office consultations.....	3,600
Country calls.....	800
Maternity cases.....	51
Minor operations.....	90
Major operations (within his competency).....	15
Immunization.....	300 persons
Salary paid.....	\$4,500.00
Major surgery (amount collected).....	300.00
Total income.....	\$4,800.00
From this deduct:	
For transportation (13,000 miles by car; 1,200 miles by snow plane; 250 miles by train).....	\$1,550.00
For drugs.....	300.00
	\$1,850.00
Which leaves the net amount for services rendered.....	\$2,950.00

Applying the unit basis of cost of service, it is observed that the doctor was paid as follows:—

1. Office consultation (2 units).....	\$.46
2. House call (3 units).....	.69
3. Maternity case (15 units).....	3.45
4. Major operation (50 units).....	11.50
5. Minor operation (10 units).....	2.30
6. Immunization (3 units).....	.69

Why do well qualified medical practitioners accept these municipal doctor contracts? There are perhaps many reasons, but most emphatically it must be stated that the primary motivating influence is a desire to secure a guaranteed income while serving humanity in one's chosen profession. On the basis of remuneration received for work done the plan should not be considered as providing adequate financial returns. Salaried appointments as municipal physicians would appear to leave much to be desired.

MEDICAL SERVICES TO THOSE ON RELIEF

Early in the recent depression through which the entire world has been passing, governmental authority in Canada decided that the unemployed and their dependents were entitled to food, fuel, shelter, and clothing at the expense of the State. The medical profession contended that medical care for these less fortunate of our citizens was just as essential as food, fuel, shelter and clothing, and that the State should not expect the doctor to contribute this service entirely at his own expense. In some parts of Canada our contention was heeded, and I shall now deal with the plan which was adopted in the Province of Ontario.

Four years ago the Ontario Division of the Canadian Medical Association entered into an agreement with the government of the province on the following terms.

For each person in the province in receipt of relief, including dependents (and at that time the number was approximately 400,000), the

Government agreed to provide the sum of 25 cents per month. The Association in turn undertook to provide for relief recipients, general practitioner services in the office and in the home, together with domiciliary obstetrical services. There was to be complete freedom of choice of doctor and patient as obtains in private practice. No finer opportunity could have been afforded the medical profession to demonstrate its ability to carry out the very principles it had been advocating for years, namely, that no third party should intervene in a plan for providing medical services to a cross section of the community.

Within thirty days, the Medical Association, working through its fifty component branches, set up 96 medical committees, representing more than 4,000 practising physicians, it being the duty of these committees in the respective areas to scrutinize and assess medical accounts and pass them on to the central administrative medical committee for final adjudication and payment. Rather than set up a special tariff for relief recipients, the Association agreed to apply its regular tariff to the service, namely, \$2.00 for an office call; \$3.00 for a house call; \$25.00 for a normal confinement, with additional allowances for mileage. It was of course recognized at the outset that the money available would not be adequate to pay assessed accounts in full; the profession did not expect that the taxpayers, of whom they form a part, would be called upon to pay 100 per cent of the medical bills for these less fortunate of our fellow citizens. Accordingly, the plan adopted was as follows: bills having been taxed, *i.e.*, checked over as to their accuracy and fairness (and one should here interpolate that a very small minority of the profession were found to be unfair with their accounts) were then added up and the total divided into the amount of money available each month, each doctor being paid *pro rata* according to the amount of his account, and each month being considered a unit by itself. At the end of two years, the amount of money which the Government agreed to pay was increased to 35 cents per relief recipient per month, out of which the profession agreed to pay the druggists 6 cents per month for the necessary drugs and supplies.

After four years of experience in providing medical care to this rather large number of people, what has the experiment taught us? We think, a number of things of very definite interest and importance, certainly to us in Canada, and perhaps to the medical profession in other parts of the world. First and foremost, the profession has demonstrated that it can organize and conduct satisfactorily a plan of medical services on a group basis, without any political, governmental, or sociological interference. Secondly, the services available to a group such as this demonstrated very clearly that morbidity quickly rises when resistance to meeting costs is removed. It was estimated at the inception of the scheme that morbidity

might stand at somewhere between 6 and 8 per cent. What are the actual morbidity results of this experiment? Here they are:—For the first year, 12.78 per cent; for the second year, 14.37 per cent; for the third year, 15.40 per cent.

In respect of remuneration to the profession, the records show the following payments in relation to total accounts as taxed and approved: first year, 45 per cent; second year, 38 per cent; third year, 51 per cent. (In the third year the 35 cents per month capita rate applied.)

Thus it will be seen that the doctors are contributing practically 50 per cent of the cost of medical services to this group. Moreover information is now available as to the actual cost of such services, which information heretofore was not available in our country.

What about the quality of the service rendered? A short time ago I directed this question to the Minister in the Government under whose régime general relief is administered. He assured me that, so far as the Government is concerned, the service is highly satisfactory; that the medical profession appear to be doing a splendid piece of work; that the relief recipients are satisfied with the care they are receiving; and that the taxpayers who are providing the funds (over four years, approximately four million dollars) are satisfied that they are getting full value for their money.

At no time has there been any interference of any kind from any source with the administration of the scheme by the medical profession. Valuable statistics have been made available with regard to morbidity and service costs. A complete and unmistakable answer has been made to that section of the public who doubt the ability of the medical profession to organize and provide adequate medical care to a large group of people without the intervention of a third party. Abundant proof is before us of the satisfaction which has accrued to the profession in finding that it was able to discharge its responsibility to itself for the proper carrying out of this experiment in medical economics. If the profession can conduct an experiment of this magnitude for 400,000 people in the Province of Ontario I have not the slightest doubt that the profession anywhere on this great continent are just as capable of carrying out a plan of medical services for any section of the public, so long as the administration is entrusted to the medical profession itself. The relationship between physician and patient has not been disturbed, and one cannot see why, in any scheme of group practice, that same relationship should not prevail.

In a number of cities in Canada somewhat similar medical relief schemes have been devised. For the past five years a complete medical service has been supplied in Greater Winnipeg to those on relief. The average number has varied from 45,000 to 35,000. Treatment is provided in the office, home, and hospital; dental, optical, x-ray and laboratory services are included. A doctor,

employed by the city, interviews all who apply for treatment, emergencies excepted, and gives permits to enable the patient to consult the doctor of his choice. The city reserves the right to have minor ailments treated by the doctor controlling medical relief.

A board of four doctors, two employed by the city and two representing practitioners, decides disputed questions, grants, or refuses authority for operations, unusual treatments, expensive laboratory or x-ray tests, and renders decisions on contested accounts. In many instances it seeks the assistance of specialist or consultant.

Accounts are rendered monthly by each practitioner on a reduced scale of fees. There is no capitation limit or fixed budget, but no doctor may collect more than \$150 per month.

In five years, disciplinary action has been requested for four practitioners out of more than three hundred who provide the service. There have been no proved cases of neglect by doctors, no tragedies, and singularly few complaints by patients. Again, the medical profession has supplied the answer to the question of its ability to provide adequate medical care without the intervention of a third party.

VOLUNTARY HEALTH INSURANCE

In the field of voluntary health insurance an interesting experiment began in Ontario some eighteen months ago, when an organization known as Associated Medical Services Incorporated¹ was established with the official blessing of the Ontario Medical Association, to offer complete medical, surgical, hospital and nursing service to those members of the community who are willing to budget for illness by paying regular premiums as follows:—

	Per month
Subscriber	\$2.00
First dependent	1.75
Second dependent	1.50
Third dependent	1.25
Fourth and other dependents	1.00

There is free choice of doctor, and in all other respects the patient enjoys the same independence and freedom of action as obtains under ordinary private practice. The plan, organized and conducted by medical men on a non-profit basis, appears to be giving complete satisfaction to an ever-growing number of forehanded persons who desire to insure at a fixed premium against the unpredictable costs of illness.

CONCLUSIONS

1. On behalf of the medical profession of Canada, I wish to join my voice with yours in saying that organized medicine is fully conscious of the medical needs of the public and is willing and able to meet those needs.

2. The medical profession has demonstrated its ability to provide medical services for large groups of people under terms which give complete satisfaction to the recipients of the service and to the medical profession.

3. A critical analysis of various schemes already in existence discloses weaknesses in many of them which the profession very properly recognize and refuse to accept.

4. From our experience we are confident that there is no need for persons outside the medical profession to assume that, unless they take it upon themselves to arrange for adequate medical care for all the people, such care will be denied those who need it most.

REFERENCE

1. FISHER, T. L.: Health insurance and Associated Medical Services Incorporated, *Canad. M. Ass. J.*, 1939, 40: 284.

DISCOVERY REGARDING SNAILS SAVES MANY HUMAN LIVES.—It is a long way from the nation's capital to Japan, and a long time from 1896 to the present day, but what was an obscure comment in a Washington scientist's notebook four decades ago has freed hundreds of thousands of rice workers in the Orient from the dangers of a baffling illness—schistosomiasis. Forty years ago some 200,000,000 people in Oriental countries were afflicted with this disease. Often it was fatal. Always it lowered energy and efficiency. Today the number of victims has been cut in half and in areas outside of China the disease is under control. Dr. Paul Bartsch, veteran curator of mollusks at the Smithsonian Institution, forty years ago made the notebook comment when studying the snails living in the Potomac River and its small tributaries near Washington. He found that snails in the Potomac proper were quite different from those inhabiting its tributaries; and yet there was no physical barrier to prevent the intermingling of the varieties. Dr. Bartsch finally found that the relative acidity of the water was the answer. The Potomac was slightly alkaline while its feeding streams were slightly acid. Some kinds of snails could live only in the acid water conditions and others only in the alkaline condition.

There was a chemical wall of life and death between the two types. What had that to do with the Orient and schistosomiasis? The Oriental disease was found to be caused by an organism which was carried in snails as a secondary host. These snails lived in an acid type water. Rice workers, particularly, were stricken with the affliction as they waded in the pools of water with bare feet and legs. Control was finally achieved by the Japanese by the simple matter of making the water alkaline with the presence of crushed limestone along the banks. The problem was much easier than the control of malaria by preventing the growth of mosquitoes. This dramatic incident in man's conquest of disease is recalled by the new publication of the Smithsonian Institution on Dr. Bartsch's further extension of his early studies. He has, for years, been systematically studying snails and mollusks and arranging them into their various genera and species. In his twenty-year study Dr. Bartsch has freed several varieties of snails from possible stigma of being carriers, indirectly, of disease organisms. Others, formerly unsuspected, are now on the "dangerous" list. With such a compilation before him, a health officer can now easily determine the organism which may be responsible for trouble in his vicinity.—*Science News Letter*, May 30, 1936.

Men and Books

THE LIFE OF SIR CHARLES TUPPER*

By J. H. L. SIMPSON, M.D.

Springhill, N.S.

In going over the list of physicians who have made contributions toward the building up of our Dominion, apart from their immediate work of public health and giving attention to the sick, we find many who have served with distinction and have made notable contributions to our public life. At present the leader of one of the two great political parties is a physician, but of all these physicians who have contributed to the public life of Canada the greatest was a native of our own province of Nova Scotia, Sir Charles Tupper.

To begin a short address about a man by tracing his ancestral background would ordinarily seem to indicate a better eye to unnecessary detail than to the interest of an audience, but in this instance I feel that there are two good reasons for doing so. First, there is much that is historically interesting about the Tupper family tree; and, second, there is much that may be significant to those of us who attach some importance to the influence of heredity.

The Tupper family, we learn, is of Teutonic origin. I suppose a Nazi propagandist might insist that it was the German minority in Sir Charles that accounted for his undoubted quality of self-determination. I am not prepared to go so far as that; nor can I go to another extreme and suggest that he was a Pictou County Scotsman, acceptable though the idea might be in some quarters. The truth seems to be that Sir Charles was a descendant of New England Puritan stock. In 1635 one Thomas Tupper emigrated from Sandwich, England, to found in Massachusetts the town of the same name, since re-named Lynn. He married the daughter of Governor Mayhew of Massachusetts, who settled on the couple an estate on which they built their home. There for three centuries some member of the Tupper family has lived. In 1763 Sir Charles Tupper's great-grandfather migrated to Nova Scotia from Massachusetts. The Crown granted him some of the lands that had been vacated in King's County by the Acadians. Here was born Sir Charles' father, the Rev. Charles Tupper, D.D., who was to pursue in the town of Amherst a career as preacher and as school teacher. His famous son was born on July 2, 1821.

The Rev. Charles Tupper was noted for his scholarship and a very retentive memory. He acquired a reading knowledge of thirteen lan-

guages and a critical knowledge of several of them. His work as a pastor was very arduous, but he found time to be principal of the Amherst grammar school as well. Many of Sir Charles Tupper's ancestors, of whom records can be traced for nine generations, were noted for strength of character and common sense. His grandmother is said to have been a woman of extraordinary talents. So we see that Sir Charles, living as he did in the cultural environment created by his father, and possessing such a splendid ancestral background, was well endowed to take the place that he did in Canadian history.

His father having decided to have him enter the medical profession, Charles Tupper at the age of sixteen was sent to Horton Academy; later, to Acadia College, where he remained for three years. In 1840 he left for Edinburgh University to take up the study of medicine. Incidentally, it is surprising to think that a man who played a commanding rôle in the affairs of our country practically until the time of the World War, was already taking his medical course only three years after Queen Victoria came to the throne. True, it was actually less than one hundred years ago, yet we know that the vessel in which Tupper made his voyage to Scotland took over six weeks to get there, and that when the young student arrived in Glasgow he had to proceed to Edinburgh by stage coach.

As for Tupper's success as a student, we may well believe that he brought to his studies the vigour and thoroughness that always distinguished him, because in 1843, at the age of twenty-two, he graduated and was admitted to the Royal College of Surgeons. Later in the same year he took his degree of Doctor of Medicine.

As thoroughly equipped for his chosen work as man could become in those days, he returned to his native land and set up practice in Amherst. We can all picture his starting out with the usual anxieties a young man has to face in beginning a practice, added to the difficulties caused by the condition of Cumberland County in the 'forties, when, to quote a contemporary, "A practising doctor needed the constitution of a horse and the clothing of an arctic explorer".

For twelve years, over the roads of Cumberland in all weathers, through mud or deep snow, untiringly he went to care for his patients. His body and his spirit were both strengthened to bear great strain and endure much. He is described as having been "a person of medium height, muscular and wiry and with intense nervous energy, which gave him quickness of movement and ceaseless mental activity". The spirit that caused him never to flinch before danger or a hard task, and that later won him

*Read before the Halifax Medical Society, Halifax, N.S., February 22, 1939.

the titles of "The Fighting Doctor" and "The War Horse of Cumberland", was nurtured in the hard school of country practice. In these days, as in his political life later, his finest characteristic was the one that Sir Wilfrid Laurier was to describe as, "a courage which no obstacle could down, which rushed to the assault, and which if repulsed came back to the combat again and again".

It was an understood fact among the invalids of Cumberland in those days that if Tupper gave you up you might as well turn your face to the wall, but until he had given you up there was every reason to hope for your recovery.

As is to be expected, more information has been preserved about Sir Charles in the political field than in the medical, not only because he spent so much more time in politics than in medicine but because his political work was national in scope, whereas his medical practice could scarcely take in more than the one county. And, of course, his political work is a matter of historical record. However, it is well known that as a doctor he was one of the outstanding practitioners of his day, and that as a surgeon he was well up in the procedures then current.

Dr. Bliss, of Amherst, has given me an interesting bit of information about Tupper's practice that I should like to quote.

"Tupper's field extended from Parrsboro and vicinity to Malagash East, practically all over the county . . . His professional skill and his courageous determination to answer distant calls under the most difficult circumstances became known far and near. Horseback was the only practical means of travel in those days, and Dr. Tupper was said to have spent a quarter of his time or more in the saddle. He was so well and widely known that he frequently, when on a long journey, left his tired horse at some stable en route and took the best horse he found there for a fresh mount—all this without disturbing the owner of the stable. The latter, finding a strange horse in place of his own on visiting his barn, knew at once that Dr. Tupper had passed that way. Long after he had entered political life some of the older residents of Cumberland County would proudly show scars from scythe or axe and say, 'Dr. Charles sewed that up and it is as good as ever'."

It was in 1852 that Tupper's interest in politics began to show itself, and we find him at a large political gathering at River Philip, to which he had driven twenty miles by horse and sleigh. Here he showed an audience of over three thousand men that he could talk and talk convincingly.

A few years later he had definitely entered political life. "Never", says one biographer, "was an instance in which a public man was more definitely prepared for his task. He had passed through his period of pupilage with credit. He had crossed the ocean—a much rarer thing in those days than now—he had spent three years in Britain. He had a pleasant home and a lucrative practice". In this practice he had many opportunities to develop confidence and resource and to make many lasting friends. In spite of his determined and hard-hitting way of dealing with men, his tact and magnetism drew them to him. It was these friends who urged

on him the nomination in the provincial election of 1855.

In this election he had a formidable opponent in the person of Joseph Howe, who was then at the height of his popularity and was fathering a project for a railway in Cumberland County. However, the young doctor plunged into the contest with the vigour that characterized him until the day of his death, and was victorious over the veteran Howe. "I was beaten by the future leader of the Conservative party," said Howe. Tupper's party, not strong in Nova Scotia at this time, became active at once, and was to find a bold champion in the young member, who declared, "I did not come here to play the game of follow the leader, but to perform honestly and fearlessly, to the best of my ability, my duty to my country".

Perhaps this is as good a time as any to tell about a certain experience of Tupper's while he was canvassing for an election. I must mention here, as I perhaps ought to have done before, that he taught school for a short time before practising medicine. Well, he was driving along the road one day during a campaign, when he happened to notice a man ploughing in a field. "Stop," he told his driver. Then he walked over to the ploughman and, telling who he was, asked the man to vote for him in the coming election. "Look here," said the man, "I went to your school when you were a teacher and you gave me a licking. I vowed then that if I ever got the chance I'd return that licking, and I guess this is as good a time as any". Tupper was, of course, a strong man physically and an adept at the manly art. "I'll do battle with you," said he. "But first you must promise that if I beat you you'll vote for me." Then he proceeded to roll up his sleeves, displaying his muscular arms. "Never mind," said the man, "I'll vote for you".

Defeated in 1855, the Conservatives won the election of 1863 and Dr. Tupper became a cabinet minister. The next year, on the resignation of Johnstone, he became premier.

One of Dr. Tupper's first moves, perhaps significant when we remember the educational interests of his father, was to introduce a bill to provide for a system of free primary schools. Advanced education was well provided for in Nova Scotia but primary education had been neglected. Free public schools had long been advocated but no political party had yet dared to bring in a bill to establish them because of the opposition of the taxpayers. However, Tupper fearlessly advocated and largely was responsible for the passing of the Free Education Act of 1864.

During this period advanced education also received his consideration, and we find him active in attempting to form a Medical School at Dalhousie University, at Halifax. The following quotation from "The Dalhousie Medical School, An Historical Sketch, 1863 to 1928" by Dr. K. A. MacKenzie, of Halifax, N.S., in the *Nova Scotia Medical Bulletin* of February, 1929, gives this

account. "An extract from the minutes of the Board of Governors of Dalhousie University dated November 28, 1863, is as follows:—'Dr. Tupper read a memorandum prepared by Professor Lawson relative to the Medical School at Kingston, and thereupon it was moved by Mr. Howe, seconded by Dr. Avery, and unanimously resolved—that the secretary communicate with the Medical Society and inquire if they would be willing to cooperate with the Board in establishing a Faculty of Medicine'." It will be noted therefore that the first proposal to form a school at Halifax was brought to the attention of the Board of Governors by very eminent men.

Dr. Tupper at this period was a general practitioner in the city, a member of the local Legislature, and later became a distinguished Canadian statesman. He was well known as an ardent proponent of the free school system of Nova Scotia, and it is obvious that the problem of medical education received careful thought. The Medical Society, after considerable discussion, did not consider it expedient to cooperate with the Board, giving two reasons, first, lack of hospital facilities and, second, the illegality of procuring bodies for anatomical study. The proposal was therefore dropped and did not come up for further consideration for a period of five years, "At which time, *i.e.*, 1870, the formation of a full Medical School at Dalhousie was carried out successfully". To quote again from Dr. MacKenzie's historical sketch.

"The student response was so good that the Faculty was encouraged to proceed with the formation of a full school. A committee was appointed, with Dr. Tupper as chairman, and after some discussion it was decided to proceed. Legislation was secured, lecturers were given the rank of professors, and the first session of the full school commenced November, 1870."

It was in 1864 that Tupper began what was probably the greatest service he ever performed for his country. The details of how Confederation became a fact instead of a dream are too complex to be gone into very thoroughly in a short address like this; however, I think it only proper to describe briefly the brilliant individual efforts of the Amherst doctor, and to stress their importance to the success of the cause.

It was Tupper who initiated the movement to establish the union of the Maritime Provinces, with the idea of going on to a broader union of all the provinces. It was Tupper who called the first conference at Charlottetown. It was Tupper who, returning from the great meeting at Quebec to find his own province full of opposition, discreetly set about to mould public opinion before carrying the issue to the polls. It was Tupper who, in 1866, carried the fight for union to London, and there successfully fought the opposition of Howe and other delegates. Best of all, it was Tupper who followed up his persistent fight by giving up the spoils of victory—a place in MacDonald's newly formed Dominion Cabinet—and urging instead that Joseph Howe be given the position, so that Howe and

Howe's power would be brought into the Confederacy. Howe readily accepted.

The first years for the federal government were stormy ones, especially the year 1870, when its fate trembled in the balance. A review of the debates of this critical period indicates that Tupper's speech helped materially in the avoidance of disaster. Immediately after, MacDonald insisted that Tupper enter his cabinet. The latter was waited upon by a large deputation of Liberal members from Nova Scotia; he acquiesced and was sworn in as President of the Council in 1870.

In the election of the same year Howe and Tupper swept the Province of Nova Scotia, but Howe's health becoming gradually worse, he was nominated by MacDonald, at Tupper's request, to the position of Lieutenant-Governor. The two men who had been such determined opponents had become close friends. Mr. Howe, on leaving Ottawa, gave a farewell luncheon, at which his parting injunction was, "Boys, I want you to stand by Tupper as he has stood by me".

History has given Tupper full credit for his work and sacrifice in the cause of Confederation. Sir Wilfrid Laurier in 1911 made the statement that "next to Sir John A. MacDonald the man who did the most to bring Canada into Confederation was Sir Charles Tupper". It has also been said of Tupper that he "carried Nova Scotia by main force into the Union and kept it there". Incidentally, during all the struggle for Confederation Tupper had not forgotten his profession. He was elected President of the Canadian Medical Association by acclamation in 1867. In acknowledging his election he said in part:

"I have had the high gratification of being seven times elected to represent my native county in the Parliament of my country, but I can assure you that no distinction that I have ever received has been a source of greater satisfaction or pride than my appointment by the vast body of distinguished and able representatives of the medical profession which now fill this hall. When I see before me so many gentlemen of attainments, who have achieved a European as well as British reputation, I feel deeply my unworthiness to fill the high position to which your kindness has elevated me; but inadequate as I may be to discharge the important duties of President of the Medical Association of the Dominion of Canada, I will yield to no man in an ardent desire to promote to the best of my ability the interests of the profession to which I have the honour to belong."

"The History of the Canadian Medical Association" has this to say:

"Only once has the post of president been filled by the same man for more than one year, and that was in the person of Sir Charles Tupper. He was chosen in 1867 and re-elected in 1868 and 1869. He then refused to allow his name to be again put forward, and from then on Dominion politics claimed him entirely . . . There was no doubt of his zeal in Association affairs, but his political work really absorbed him completely."

In 1869, during the first Riel rebellion, Sir Charles Tupper was the hero of an exploit that showed his resolute and fearless character. It was his trip to Fort Garry, which had been seized by Louis Riel. Tupper's daughter, the wife of

Captain Cameron who was a member of the Lieutenant-Governor's party, had been made prisoner along with her husband, and their belongings had been seized by the rebels. Sir Charles determined to rescue his daughter. In the meantime Sir John A. MacDonald, knowing the kind of man Tupper was, asked him to undertake the dangerous mission of interviewing Riel. Sir Charles accepted the task without a moment's hesitation. The recovery of his daughter's baggage was a good pretext for visiting the country.

The trip was made in the dead of winter with no means of reaching Fort Garry, now Winnipeg, except through the United States, and then by overland trails for over two hundred miles to Pembina, with nothing but a canvas-covered sled during the day and a tent for the night. Sir Charles finally reached his daughter at Pembina on Christmas Eve. On the next day he started for Fort Garry. He had been warned against the journey as follows:—"It is at the cost of one's life to go to Fort Garry just now. Riel has seized the fort, and has all the arms and ammunition and whisky. A man was shot yesterday, and it is simply courting death to go there at present. For God's sake do not go."

"I said I was much obliged," Sir Charles relates in his reminiscences, "but did not come for advice, and that I would take the dog-carriole . . . A dog-carriole is a large canvas shoe on a toboggan, in which a man can lie down, and the driver stands on the open part behind him . . . There was about a foot of snow on the prairie, but we drove on a beaten track. The sun went down, and shortly afterward the boy pulled up and said, 'We must go back. There is going to be a frost'. The temperature was then thirty degrees below zero. I said, 'What do you mean?' He replied: 'You will soon see'. Within ten minutes we were enveloped in a frozen fog, so dense that I could not make out the horse's head . . . 'We will make a fire,' I remarked. 'I have no matches and no axe,' the boy replied."

It was then that Tupper realized that he was not only cold and in complete darkness, but definitely lost on the trackless midwinter prairie, many miles from the nearest settlement. However, we may well believe that he had not maintained a country practice throughout twelve old-time Cumberland winters without some profit to his resourcefulness. When the "frost" had cleared, he found his bearings by the pole star. Two days later he finally arrived at Fort Garry.

In his interview with Riel Tupper did not touch on matters political, because of the uncompromising attitude of the half-breed leader. But in a discussion with Father Richot, of Fort Garry, he urged that a deputation be sent to Ottawa, and assured him that all grievances would be given a sympathetic hearing. On January 3rd, with Captain and Mrs. Cameron, he started the return trip. After experiencing many difficulties with the cold and a severe blizzard they finally reached the railway on the 13th.

Within the next ten years, from 1870 on, Sir Charles Tupper was successively Minister of

Inland Revenue, of Customs, of Public Works, and of Railways and Canals. In the last-named position he had much to do with the building of the C.P.R. He had assumed a leading rôle in defending the C.P.R. proposal in 1877, when he made perhaps his most famous speech, which lasted no less than five hours. If I had the choice of preparing a five-hour speech or building the C.P.R. single-handed, I know where my choice would lie, but it must be said that the manner in which Sir Charles presented his main argument, namely that *not* to build the railway would probably be to lose British Columbia to the United States, doubtless had much to do with the fact that the C.P.R. became an accomplished fact in 1885.

For four years, from 1883 on, Sir Charles was Canada's High Commissioner in England. An incident that occurred during his tenure of this office shows how handy a medical training can be even to a High Commissioner. A consignment of Canadian cattle arriving in Liverpool had been condemned to be slaughtered on the ground that some of them were affected with pleuropneumonia. Tupper received a cable from the shipper asking for his advice and help.

Sir Charles immediately procured a book on the diseases of animals and with a kit of surgical instruments boarded the train for Liverpool. On the train he applied his mind to study, and he was well up on the subject of pleuro-pneumonia in animals when he arrived. Having hastened to the cattle yards, he pinned each inspector down to exact detail, ordering each one to define why and how the different cattle had been condemned and what should be found if post mortems were to be made. He then required each condemned animal to be slaughtered, and proceeded, rolling up his sleeves, to the dissection of the various parts with a thoroughness that left no question of uncertainty. On no examination was any sign of the disease to be found. By evening he had convinced the inspectors that they must be wrong in their conjectures. The Liverpool inspectors, so the story goes, made no more hasty condemnations of Canadian cattle lest, as one of them put it, "that old devil from London should blow down here again".

In 1887, as Minister of Finance, he performed a very tactful and effective service on the Fisheries Commission in Washington. Largely through his efforts, the worst crisis between Canada and the United States since 1812, and the last until some far un hoped-for day, was effectively averted. In 1893, once again acting as High Commissioner in England, he helped to negotiate a valuable treaty between Canada and France.

Sir John A. MacDonald had been defeated in 1873, on charges by Alexander MacKenzie of corruption in the building of the C.P.R.; but he came back to power in 1878, continuing as head of the Government until his fatal illness in 1891. Looking forward to what might happen to his party after he was gone he said, "After me the

deluge". Three Prime Ministers succeeded each other in rapid succession; then in 1896 a call was sent out to the veteran Tupper in England, and, in spite of his 75 years, it is said of him that he "dashed into the fray like a regiment of cavalry". His courage and experience were of no avail. He was Premier but for a short time and leader of the Opposition for four years. Fighting his last campaign at the age of 79, he made sometimes as many as three or four speeches a day. On the night of the election, which ended in defeat, it is said that he went to bed and slept soundly, showing that he was able to carry heavy responsibilities without undue worry.

He retained his keen interest in affairs until the last, and never lost his spirit of youthful enthusiasm. Many who knew him testified to his dominating personality. One said that wherever Sir Charles happened to be, life was breezy

and dullness fled; another, that "fear of man was to him a sound without meaning, and he might be loved and admired, hated or feared, but he was too positive ever to be ignored". Many other tributes to the character and work accomplished by this grand old doctor from Cumberland County might be told, but in closing I will quote the one I feel expresses his highest ideals and aims. Says one who knew him well: "As a loyal subject to his Queen and as a jealous guardian of the honour of his people, his aims have been the strengthening of a golden link which connects Great Britain with the first and greatest of her colonies and the holding aloft of the great standard of right of the nation, so that she may prove herself worthy of that proud position she has made her own."

And we remember with pride that he was a member of our profession!

Association Notes

THE SEVENTIETH ANNUAL MEETING OF THE CANADIAN MEDICAL ASSOCIATION, WITH THE ASSISTANCE OF THE QUEBEC DIVISION OF THE ASSOCIATION, TO BE HELD IN MONTREAL, JUNE 19, 20, 21, 22, 23, 1939

Convention Headquarters, Windsor Hotel

The Canadian Medical Association

President, K. A. MACKENZIE, Halifax;
President-elect, F. S. PATCH, Montreal;
General Secretary, T. C. ROUTLEY, Toronto.

The Quebec Division

President, W. W. LYNCH, Sherbrooke, Que.;
President-elect, D. S. LEWIS, Montreal;
Secretary, A. W. YOUNG, Montreal.

GENERAL INFORMATION

N.B.—All time stated in this program is Eastern Daylight Saving Time.

Registration

The Registration Desk is located in the Foyer at the west end of the Concourse, Windsor Hotel, Montreal.

Membership in good standing in the Canadian Medical Association constitutes eligibility for registration, except in the case of regular medical practitioners from other countries who are entitled to register as guests. Interns, nursing supervisors and others who may wish to attend as visitors should obtain a card or note from a member of the Registration Committee. Canadian practitioners who are not members of the Canadian Medical Association may register upon the payment of the annual fee of ten dollars. The Registration Booth will also serve as a centre of general information.

Badges for members and guests will be issued upon registration, and will be required for admission to meetings and functions.

The members of the Montreal Committee on Arrangements will wear navy blue ribbon badges with "Committee" printed thereon.

Members of General Council will wear red ribbon badges.

Visiting ladies are requested to register immediately upon arrival. They will be supplied with badges and will be given programs containing full information regarding entertainment.

The Ladies' Committee will wear white ribbon badges with "Ladies' Committee" printed thereon.

Special entertainment is being arranged for all young people coming to the convention. They are requested to register promptly on their arrival at the Windsor Hotel. They will be given badges and programs containing information regarding entertainment.

The members of the Young People's Entertainment Committee will wear pale blue badges with "Junior Committee" printed thereon.

Inquire at the Registration Desk for mail, telegrams and messages.

Annual General Meeting

The Annual General Meeting will be held in the Windsor Hotel on Wednesday evening, June 21st, commencing at 8.30 o'clock.

A Reception and Dance at the Chalet on Mount Royal will take place following the Annual General Meeting. One of the best known orchestras in Canada will provide the music, and light refreshments will be served. The Chalet is situated at the Lookout on the Mountain, and a fine view of the city by night will be afforded. Buses will begin to leave the Windsor Hotel at about 10.00 p.m., and will not only convey guests direct to the Chalet but will return them to the Windsor Hotel later in the evening. Note: A rigid city by-law stipulates that no motor vehicles are allowed on Mount Royal. The Montreal City Council has given permission to the Association to transport our guests via motor bus only on the night of this function. Visitors to the city are specifically warned that they will be prohibited from driving their private cars to the Mountain on this night.

Canadian Medical Association, Quebec Division

The Annual Meeting of the Canadian Medical Association, Quebec Division, will be held on Wednesday, June 21st, at 5.30 p.m., in Windsor Hall.

Canadian Medical Protective Association

The annual business meeting of the Canadian Medical Protective Association will be held in Windsor Hall on Thursday, June 22nd, at 5.30 p.m.

President, Dr. J. Fenton Argue, Ottawa.

Secretary-Treasurer, Dr. T. L. Fisher, Ottawa.

Federation of Medical Women

The local members of the Federation of Medical Women of Canada will entertain visiting medical women at tea on Tuesday afternoon, June 20th.

The members of the Executive of the Federation will meet at lunch on Thursday, June 22nd.

A dinner for the visiting medical women will be held at the University Women's Club on Thursday, June 22nd, when the annual meeting of the Federation of Medical Women of Canada will take place. The president, Dr. Jessie Boyd Scriver will preside.

Full details will be available at the Registration Desk.

Joint Committee on Medical Education, Licensure and Hospitals

Delegates from the various associations, appointed to consider the formation of a joint committee dealing with Medical Education, Licensure and Hospital Activities, will meet in

Salon E, Windsor Hotel, at 4.00 p.m. on Tuesday, June 20th.

Scientific Exhibits and Motion Pictures

The Scientific Exhibits have now become a permanent feature of the annual conventions of the Canadian Medical Association. A number of very interesting scientific contributions and Motion Pictures by outstanding clinicians and research workers have been assembled. These exhibits will well repay a careful study.

Commercial Exhibits

Attention is called to the splendid display of Commercial Exhibits. All members are urged to visit the exhibits as often as possible during the progress of the convention. The Association is anxious that the exhibitors be given the encouragement they deserve.

TRANSPORTATION

Identification Certificates may be obtained from the office of the General Secretary, 184 College Street, Toronto. These certificates entitle the purchaser to round-trip fare at one and one-third of the adult normal one-way first class or coach fare.

Tickets may be purchased under the identification certificate plan on the following dates:

From British Columbia, June 11th to 17th, inclusive;

From Alberta, June 12th to 18th, inclusive.

From Saskatchewan, Manitoba, Ontario, Quebec and the Maritime Provinces, June 13th to 19th, inclusive.

The return limit is thirty days, in addition to date of sale. Passengers must reach original starting point not later than midnight of the final return limit.

Round-trip tickets will be sold at the rate of one fare and one-third of current fares, plus 25 cents, upon presentation of **Identification Certificates** to the ticket agent at time of purchase of ticket, going and returning via same route, or going via one authorized route and returning via any other authorized route.

MONTREAL HOTELS

DAILY RATES - EUROPEAN PLAN

	Single room without bath	Single room with bath	Double room without bath	Double room with bath
Windsor Hotel....	Nil	\$4.00	\$4.50	\$7.00
Mount Royal Hotel	Nil	4.00	4.50	7.00
Ritz-Carlton Hotel	Nil	5.00	Nil	8.00
Queen's Hotel.....	\$1.50 & 2.00	2.50 to 3.50	3.00	3.50 4.00 4.50
Berkeley Hotel....	Nil	3.00 3.50	Nil	5.00 6.00
Hotel De LaSalle..	Nil	3.00 3.50	Nil	4.00 4.50
Ford Hotel.....	1.50 & 1.75	2.00 to 2.50	2.50 to 2.75	3.00 to 5.00

Please inquire of your ticket agent in reference to summer tourist rates which may be in effect at the time of your departure. It is possible that these rates may be on a lower basis than Identification Certificate Plan fares.

HOUSING

The Committee on Housing would appreciate it if those attending the convention would register early. See list of hotels and their rates on page 611.

Golf

The Annual Golf Tournament will be held on Friday afternoon, June 23rd, at the Royal

Montreal Golf Club, Dorval, Que. Players will tee off between 1.00 and 3.00 p.m. Following the tournament a Golf Banquet will be held, to which all Association are given a cordial invitation. The Ontario cup and other prizes will be presented at the conclusion of the dinner.

The Royal Montreal Golf Club is situated on the main road to Toronto, Route No. 2, about eight miles from the Windsor Hotel. The entrance is just beyond the city limits of Lachine, Que., and is marked by two upright posts painted red and blue. Turn right and drive away from main road 400 yards. Information as to transportation, etc., will be available at the Golf Committee's reception desk in the Windsor Hotel.

GENERAL PROGRAM

Monday, June 19th

- 9.00 a.m.—Registration.
- 9.30 a.m.—Meeting of General Council.
- 12.30 p.m.—Luncheon. Guest Speaker, Hon. Mr. Justice E. Fabre Surveyer, Montreal.
- 2.00 p.m.—Meeting of General Council.
- 6.00 p.m.—Meeting of Nominating Committee.
- 8.30 p.m.—Ritz-Carlton Hotel—Public Address, under the auspices of the Committee on Nutrition of the Canadian Medical Association—E. P. Cathcart, Professor of Physiology, University of Glasgow. Subject, "Food and Nutrition."

Tuesday, June 20th

- 9.30 a.m.—Meeting of General Council.
- 12.30 p.m.—Luncheon. Address by Sir Arthur MacNalty, Chief Medical Officer of the Ministry of Health for Great Britain, London, England.
- 2.00 p.m.—Meeting of General Council.
- 2.15 p.m.—Official Opening of Exhibit Hall.
- 4.00 p.m.—Meeting of Joint Committee on Medical Education, Licensure and Hospitals.
- 7.30 p.m.—Dinner to General Council.

Wednesday, June 21st

- 8.00 a.m.—Registration.
- 8.30 a.m.—Round-table Conferences and Instructional Courses.
- 9.30 a.m.—General Session.

Wednesday, June 21st—Continued

- 1.00 p.m.—Luncheon.
- 2.30 p.m.—Sectional Meetings.
- 5.30 p.m.—Annual Meeting, Quebec Division, Canadian Medical Association.
- 8.30 p.m.—Annual General Meeting.
- 10.00 p.m.—Reception and Dance, the Chalet, Mount Royal.

Thursday, June 22nd

- 8.00 a.m.—Registration.
- 8.30 a.m.—Round-table Conferences and Instructional Courses.
- 9.30 a.m.—Sectional Meetings.
- 1.00 p.m.—Luncheon.
- 2.30 p.m.—Meeting of incoming Executive Committee.
- 2.30 p.m.—General Session.
- 5.30 p.m.—Meeting of Canadian Medical Protective Association.
- 7.30 p.m.—Alumni and Private Dinners.
- 10.30 p.m.—Dance, Normandie Roof, Mount Royal Hotel.

Friday, June 23rd

- 8.00 a.m.—Registration.
- 8.30 a.m.—Round-table Conferences and Instructional Courses.
- 9.30 a.m.—General Session.
- 1.00 p.m.—Golf Tournament, Royal Montreal Golf Club, Dorval, Que.
- 7.30 p.m.—Golf Dinner, Royal Montreal Golf Club.

FINAL SCIENTIFIC PROGRAM

GENERAL SESSIONS

Wednesday, June 21st

- 9.30 a.m.— Windsor Hall
 Pulmonary emphysema—Dr. J. D. Adamson, Winnipeg.
 A review of the present status of hypertension—Dr. J. C. Meakins, Montreal.
 Retinal changes in arterial hypertension—Dr. A. J. Bedell, Albany, N.Y.
 President's Valedictory Address—Dr. K. A. MacKenzie, Halifax.
 Nutrition—Professor E. P. Cathcart, Glasgow, Scotland.

Thursday, June 22nd

- 2.30 p.m.—
 Gall-bladder surgery—Dr. F. B. Gurd, Montreal.
 Treatment of dysmenorrhœa—Dr. Norman Miller, Ann Arbor, Mich.
 The use of the Smith-Peterson pin in fractures of the neck of the femur—Dr. W. E. Gallie, Toronto.
 Epilepsy and the cerebral lesions of birth and infancy—Dr. Wilder Penfield, Montreal.
 Insulin therapy and hypoglycæmia for cases of schizophrenia—Dr. E. C. Menzies, Saint John.
 Syphilis as a Canadian problem—Dr. F. E. Cormia, Montreal.

Friday, June 23rd

- 9.30 a.m.—
 Review of specific therapy in pneumonia—Dr. James Ross, Montreal.
 Some essentials to the successful radiation therapy of cancer—Dr. G. E. Richards, Toronto.
 Infant feeding during the past three decades—Dr. H. B. Cushing, Montreal.

The Lister Oration

- A consideration of recent advances in surgery in the light of Lord Lister's studies—Dr. Allen O. Whipple, New York.

The Osler Hour

- Typhoid fever—Dr. J. C. Meakins, Montreal.
 Acute endocarditis—Dr. A. H. Gordon, Montreal.
 Aortic syphilis—Dr. John Hepburn, Toronto.
 Polycythæmia rubra vera—Dr. Duncan Graham, Toronto.

ROUND-TABLE CONFERENCES AND INSTRUCTIONAL COURSES

NOTE.—It is suggested that any member who has a question he would like to have answered at one of the Round Table Conferences, submit it in writing to the Central Program Committee, 184 College Street, Toronto, prior to the meeting, or hand it in at the Registration Desk during the meeting. All questions so received will be delegated by the committee to those well qualified to answer them. This, of course, will not preclude questions being asked and answered during the course of the Round Table Conferences.

Anæsthesia

THURSDAY, JUNE 22ND

- 9.30 a.m.— Salon D
 Subject: The choice of anæsthetic.
 Dr. Wesley Bourne, Montreal (Chairman).
 Dental anæsthesia—Dr. Moise M. Clermont, Montreal.
 Plastic surgery of head and neck—Dr. H. R. Hargrave, Toronto.
 Cæsarean section—Dr. Kenneth M. Heard, Toronto.
 Diseases of the liver—Dr. P. E. O'Shaughnessy, Montreal.
 Heart disease—Dr. H. J. Shields, Toronto.
 Kidney operations—Dr. E. H. Watts, Edmonton.
 Brain surgery—Dr. F. A. H. Wilkinson, Montreal.
 Diabetes—Dr. Don A. Warren, Hamilton.
 Suprapubic prostatectomy—Dr. J. A. Blezard, London.
 Transurethral prostatectomy—Dr. K. E. Hollis, Toronto.
 Anæsthesia for the aged—Dr. Walter L. Muir, Halifax.

Dermatology

THURSDAY, JUNE 22ND

- 11.00 a.m.— Salon B
 Subject: The treatment of eczematous reactions.
 Dr. J. F. Burgess, Montreal (Chairman);
 Dr. B. D. Usher, Montreal;
 Dr. D. S. Mitchell, Montreal.

Medicine

WEDNESDAY, JUNE 21ST

- 8.30 a.m.— Salon E
 Anæmia—Dr. Joseph Kaufmann, Montreal.

THURSDAY, JUNE 22ND

8.30 a.m.—

Diuretics—Dr. D. Selater Lewis, Montreal.

FRIDAY, JUNE 23RD

8.30 a.m.—

Pneumonia—Dr. A. H. Gordon, Montreal.

Military Medicine

THURSDAY, JUNE 22ND

11.30 a.m.—

Room 126

The training of a medical officer—Major James A. Linton, Ottawa; Lieutenant-Colonel Gordon Kenning, Victoria.

Obstetrics and Gynæcology

WEDNESDAY, JUNE 21ST

8.30 a.m.—

Duke of York Salon

Subject: Puerperal infection.Dr. James R. Goodall, Montreal (*Chairman*).

The relationship of sepsis to the general maternal mortality in Canada—Dr. Ernest Couture, Ottawa.

The importance of a normal labour versus operative delivery in the prevention of infection—Dr. H. C. Burgess, Montreal.

The treatment of infection—Dr. L. T. Armstrong, Toronto.

THURSDAY, JUNE 22ND

8.30 a.m.—

Subject: Toxæmia of pregnancy.Dr. William A. Scott, Toronto, (*Chairman*).

Important clinical features of toxæmia—Dr. H. B. VanWyck, Toronto.

The diagnosis and prognosis of toxæmia—Dr. Ross Mitchell, Winnipeg.

The treatment of toxæmia—Dr. R. B. Meiklejohn, Toronto.

FRIDAY, JUNE 23RD

8.30 a.m.—

Subject: Hæmorrhage at the menopause.Dr. Léon Gérin-Lajoie, Montreal (*Chairman*).

The influence of the ovarian hormones on hæmorrhage at the menopause—Dr. Melville Watson, Toronto.

Diagnosis of hæmorrhage at the menopause—Dr. J. Stewart Henry, Montreal.

Treatment of hæmorrhage at the menopause—Dr. J. E. Gendreau, Montreal, and Dr. W. A. G. Bauld, Montreal.

Ophthalmology

THURSDAY, JUNE 22ND

8.30 a.m.—

Room 124

Subject: Glaucoma, diagnosis and treatment.Dr. S. Hanford McKee, Montreal (*Chairman*).

Biochemical changes in glaucoma—Dr. T. H. Hodgson, Toronto.

Diagnosis of glaucoma—Dr. Stuart Ramsey, Montreal.

Treatment of glaucoma—Dr. J. A. MacMillan, Montreal.

Otolaryngology

WEDNESDAY, JUNE 21ST

8.30 a.m.—

Salon F

Pathology of the ear—Dr. Gregor McGregor, Toronto.

The management of acute infections of the ear—Dr. J. K. M. Dickie, Ottawa.

Special technique in mastoid and facial nerve surgery—Dr. J. A. Sullivan, Toronto.

The diagnosis and present treatment of sinus disease—Dr. Perry G. Goldsmith, Toronto.

THURSDAY, JUNE 22ND

8.30 a.m.—

Pathology of the nose and throat—Dr. Gregor McGregor, Toronto.

The diagnosis and surgical treatment of suppurative petrositis—Dr. D. E. S. Wishart, Toronto.

Lesions of the mouth of interest to the physician—Dr. John W. Gerrie, Montreal.

Atrophic rhinitis and ozæna—Dr. R. P. Wright, Montreal.

FRIDAY, JUNE 23RD

8.30 a.m.—

Headaches and neuralgia of the face—Dr. Francis L. McNaughton, Montreal.

The conservative and radical treatment of chronic otorrhœa—Dr. J. T. Rogers, Montreal.

Allergy in relation to the ear, nose and throat—Dr. A. T. Henderson, Montreal.

X-ray examination of the mastoids and sinuses—Dr. A. E. Childe, Montreal.

Pædiatrics

WEDNESDAY, JUNE 21ST

8.30 a.m.—

Oak Room

Subject: X-ray lesions of the bones in infancy.Dr. L. M. Lindsay, Montreal (*Chairman*);

Dr. A. E. Childe, Montreal;

Dr. Howard S. Mitchell, Montreal.

THURSDAY, JUNE 22ND

8.30 a.m.—

Subject: Convulsions in infancy and childhood.Dr. S. Graham Ross, Montreal (*Chairman*);

Dr. A. W. Young, Montreal.

FRIDAY, JUNE 23RD

8.30 a.m.—

Subject: Tuberculosis in Childhood.Dr. H. P. Wright, Montreal (*Chairman*);

Dr. P. N. MacDermot, Montreal.

Radiology

WEDNESDAY, JUNE 21ST

8.30 a.m.—

Room 135

Subject: Spot-film radiography.Dr. W. L. Ritchie, Montreal (*Chairman*);

Dr. A. C. Singleton, Toronto;

Dr. A. M. McNabb, Ottawa.

THURSDAY, JUNE 22ND

8.30 a.m.—

Subject: The radiological treatment of cancer.Dr. J. E. Gendreau, Montreal (*Chairman*);

Dr. W. L. Ritchie, Montreal;

Dr. Carleton B. Peirce, Montreal;

Dr. Origène Dufresne, Montreal.

Surgery

WEDNESDAY, JUNE 21ST

8.30 a.m.—

Windsor Hall

Subject: Oblique and direct inguinal hernia; choice of the radical operation.Dr. Geo. E. Wilson, Toronto (*Chairman*);

Dr. C. B. Keenan, Montreal;

Dr. R. K. Magee, Peterborough.

THURSDAY, JUNE 22ND

8.30 a.m.—

Subject: Surgical treatment of acute appendicitis.Dr. E. W. Archibald, Montreal (*Chairman*);

Dr. François Roy, Quebec.

Dr. Roscoe R. Graham, Toronto.

Urology

WEDNESDAY, JUNE 21ST

4.00 p.m.—

Salon G

Subject: Prostatectomy.Dr. D. W. MacKenzie, Montreal (*Chairman*);

Dr. H. D. Morse, Winnipeg.

THURSDAY, JUNE 22ND

11.00 a.m.—

Subject: Urinary antiseptics with particular reference to mandelic acid and sulphanilamide therapy.Dr. D. R. Mitchell, Toronto (*Chairman*);

Dr. R. E. Powell, Montreal.

SECTIONAL MEETINGS

Section of Anæsthesia

WEDNESDAY, JUNE 21ST

2.30 p.m.—

Salon D

Selection of anæsthesia for upper abdominal operations—Dr. C. C. Stewart, Montreal.

Studies with a newer anæsthetic—Dr. W. Easson Brown, Toronto.

Anæsthesia in orthopædic and thoracic surgery—Dr. Georges Cousineau, Montreal.

Cyclopropane as a complete anæsthetic agent—Drs. B. C. Leech, Regina, and Harold R. Griffith, Montreal.

Nupercaine spinal anæsthesia in abdominal surgery—Dr. A. R. Wilkins, Toronto.

Section of Dermatology

WEDNESDAY, JUNE 21ST

2.30 p.m.—

Salon B

The treatment of plantar warts by roentgen radiation—Dr. Norman Wrong, Toronto.

The place of allergy in the diagnosis of skin conditions—Dr. D. E. H. Cleveland, Vancouver.

Some fundamental principles in the treatment of skin disorders—Dr. Geo. B. Sexton, London.

The cosmetic eye; a peri-ocular dermatitis—Dr. Lemuel P. Ereaux, Montreal.

Atopic dermatitis in infants (infantile eczema), children, and young adults—Dr. Geo. S. Williamson, Ottawa.

THURSDAY, JUNE 22ND

9.30 a.m.—

Syphilis of the nervous system—Dr. A. Marin, Montreal.

The prevention of congenital syphilis—Drs. E. J. Trow and Noble Black, Toronto.

The chemotherapy of acquired syphilis—Dr. Harold Orr, Edmonton.

11.00 a.m.—

Round Table Conference (see page 613).

Section of Historical Medicine

WEDNESDAY, JUNE 21ST

2.30 p.m.—

Osler Library, McGill University

An exposure of Doctor Pierre de Sales Laterrière (1747-1815)—Dr. Léo Pariseau, Montreal.

The astonishing career of John Palmer Litchfield, first professor of forensic medicine at the University of Queen's College, Kingston—Dr. Thos. Gibson, Kingston.

Dr. Cheadle in Western Canada, 1862-1863—Dr. Ross Mitchell, Winnipeg.

Alberta Medicine in the eighties—Dr. H. C. Jamieson, Edmonton.

Osler's pathological collection and his literary output (illustrated)—Dr. Maude Abbott, Montreal.

THURSDAY, JUNE 22ND

9.30 a.m.—

Oliver St. John Gogarty; the Celt as physician
—Dr. E. P. Scarlett, Calgary.

Hippocrates' Hawley Table—Dr. J. H. Couch,
Toronto.

Our debt to Hippocrates (lantern slides)—Dr.
Eugène St. Jacques, Montreal.

An hour in Salerno—Dr. J. H. Elliott, Toronto.

Antique medical caricatures—Dr. T. G. H.
Drake, Toronto.

Section of Medicine

WEDNESDAY, JUNE 21ST

2.30 p.m.—

Salon E

Angina pectoris; a case study—Dr. E. P. Scar-
lett, Calgary.

Goitre et hypertension arterielle.

Considération à propos de 700 cas de goitre
—Dr. J. B. Jobin, Quebec.

The hypertensive heart—Dr. A. B. Walter,
Saint John.

Boeck's Disease (sarcoid); its clinical groups
and diagnosis—Dr. John H. Palmer, Mon-
treal.

The physician's interest in gall-bladder disease
—Dr. A. H. Gordon, Montreal.

The diagnosis and treatment of neurotic dis-
orders—Dr. D. G. McKerracher, Brock-
ville, Ont. (read by title).

THURSDAY, JUNE 22ND

9.30 a.m.—

Treatment of hæmorrhagic states—Dr. E. S.
Mills, Montreal.

The diagnosis and treatment of refractory
anæmias—Dr. Lennox Bell, Winnipeg.

Bronchoscopy in sanatoria; its use as an aid in
diagnosis and treatment—Drs. J. H. Hol-
brook and Paul Rabinowitz, Hamilton.

Pollen Disease in Western Canada—Dr. Charles
H. A. Walton, Winnipeg.

L'Obésité. Quelques considérations étiologiques
et modalités thérapeutiques—Drs. J. R.
Pépin and René Dandurand, Montreal.

Dangers of protamin zinc insulin—Dr. I. M.
Rabinowitch, Montreal.

Section of Military Medicine

THURSDAY, JUNE 22ND

9.30 a.m.—

Room 126

Investigations on the "blacking out" of Pilots,
R.A.F.—Major Hugh Cameron, Toronto.

Mechanization in Relation to the Army Medical
Services—Lt.-Col. R. M. Gorssline, D.S.O.,
Montreal.

11.30 a.m.—

Round Table Conference (see page 614).

Section of Obstetrics and Gynæcology

WEDNESDAY, JUNE 21ST

2.30 p.m.—

Duke of York Salon

Breech presentation: a method of treatment
with discussion of results—Dr. N. W. Phil-
pott, Montreal.

Treatment of placenta prævia—Dr. W. A. Scott,
Toronto.

The treatment of vertex occipito-posterior posi-
tion—Dr. John Mann, Toronto.

The management of labour in the elderly pri-
miparous woman—Dr. James Duncan,
Montreal.

Induction of labour—Dr. W. P. Tew, London.

The management of delayed labour—Dr. G. C.
Melhado, Montreal.

THURSDAY, JUNE 22ND

9.30 a.m.—

The value of a well-organized prenatal clinic—
Dr. J. D. McQueen, Winnipeg.

Skin affections of the new-born—Dr. Alan
Ross, Montreal.

The significance of the endocrine assays in
threatened and habitual abortion—Dr.
John S. L. Browne, Montreal.

The clinical significance of vulvar lesions—Dr.
P. J. Kearns, Montreal.

The diagnosis and treatment of endometriosis
—Dr. Geo. Hooper, Ottawa.

The clinical significance of sterility—Dr. A. D.
Campbell, Montreal.

Section of Ophthalmology

WEDNESDAY, JUNE 21ST

2.30 p.m.—

Room 124

Changes in the fundus oculi following splanch-
nectomy in malignant hypertension—Drs.
F. T. Tooke, Montreal and J. V. V.
Nicholls, Montreal.

Eye-signs in intracranial disease—Dr. R. J. P.
McCulloch, Toronto.

Recent advances in the care of the insensitive
cornea—Dr. Alexander E. MacDonald, To-
ronto.

Keratitis bullosa and keratitis vesicular—Dr.
François Badeaux, Montreal.

A pathological study of perforating corneal
wounds—Dr. K. B. Johnston, Montreal.

THURSDAY, JUNE 22ND

9.30 a.m.—

Some observations on the surgical treatment of
concomitant strabismus—Dr. Howard
Folger, Kingston.

Thursday, June 22nd—Continued

- Moving pictures of muscle operations—Dr. J. P. Gilhooly, Ottawa.
- Hemianopsia with spared macula—Dr. H. M. Macrae, Toronto.
- The virus of inclusion conjunctivitis—Dr. Hanford McKee, Montreal.

Section of Otolaryngology

WEDNESDAY, JUNE 21ST

- 2.30 p.m.— Salon F
- Focal infection in the nose and throat—Dr. Howard McCart, Toronto.
- The testing of hearing aids—Dr. Godfrey Burr, Montreal.
- Routine hearing tests—Dr. D. E. S. Wishart, Toronto.
- How to be wrong; the x-ray, a quick and easy method—Dr. H. W. Schwartz, Halifax.

THURSDAY, JUNE 22ND

- 9.30 a.m.—
- Foreign bodies in the air and food passages—Dr. David H. Ballon, Montreal.
- The significance of lung collapses to the otolaryngologist—Dr. S. Laird Alexander, Toronto.
- Diagnosis and treatment of malignant tumours of the pharynx—Dr. F. A. Cays, Kingston.
- Tumours and cysts of the mouth and jaw and their treatment—Dr. E. F. Risdon, Toronto.
- Treatment of nasal sinus infection by ultra-short-wave diathermy—Dr. W. P. E. Paterson, Ottawa.

Section of Pædiatrics

WEDNESDAY, JUNE 21ST

- 2.30 p.m.— Oak Room
- Observations on the results of self-selection of diets by infants—Dr. Clara Davis, Winnetka, Ill.
- Etiology and treatment of nephritis in childhood—Dr. Alan Ross, Montreal.
- The use of the sedimentation rate in pædiatric practice—Dr. Jessie Boyd Scriver, Montreal.
- The treatment of diabetes in children—Dr. Gladys Boyd, Toronto.
- Vitamin D intoxication in infancy—Drs. Graham Ross, Montreal, and W. E. Williams, Montreal.
- Some aspects of intra-cranial birth injuries—Dr. Reginald Kinsman, Vancouver.

THURSDAY, JUNE 22ND

- 9.30 a.m.—
- Immunization in whooping-cough—Dr. Nelles Silverthorne, Toronto.
- Newer drugs in the treatment of epilepsy—Drs. Haddow M. Keith, Montreal and J. N. Petersen, Montreal.
- The significance of melæna—Dr. Harold Little, London.
- Recurrent abdominal pain in children—Dr. R. R. Fitzgerald, Montreal.
- Some aspects of the neo-natal death rate problem—Dr. King Rowan-Legge, Ottawa.
- Histopathology of vitamin A deficiency (lantern slides)—Dr. Bruce Chown, Winnipeg.

Section of Radiology

WEDNESDAY, JUNE 21ST

- 2.30 p.m.— Room 135
- Hypertrophy of the pyloric muscle in the adult—Dr. E. M. Crawford, Pointe Claire, Que.
- Lymphosarcoma of the stomach—Dr. E. C. Brooks, Montreal.
- Syphilis of the stomach—Dr. W. W. Bryan, Montreal.
- Cancer of the stomach: Its relation to gastric ulcer—Drs. A. C. Singleton, Toronto and Jos. Sommers, Toronto.
- Seriescopy—Dr. Jules Gosselin, Quebec.

THURSDAY, JUNE 22ND

- 9.30 a.m.—
- Loeffler's Syndrome—Dr. J. W. McKay, Montreal.
- The value of hysterosalpingography in gynaecological diagnosis—Drs. J. E. Gendreau, Montreal and O. Dufresne, Montreal.
- Bronchogenic carcinoma—Dr. Carleton B. Peirce, Montreal.
- Epithelioma of the limbus; biopsy; radium treatment; result after five years—Dr. E. P. Grenier, Montreal.
- The findings in an x-ray film of the chest of an electric-arc welder—Dr. W. A. Jones, Kingston and Mr. G. Hayunga, Ph.G., Kingston.

Section of Rheumatic Diseases

WEDNESDAY, JUNE 21ST

- 2.30 p.m.— Room 126
- Presidential address—The medical profession and the rheumatic disease problem—Dr. Douglas Taylor, Montreal.
- Orthopædic methods in the treatment of arthritis—Dr. J. A. Nutter, Montreal.
- Some observations on vaccine treatment of arthritis—Dr. W. S. Barnhart, Ottawa.
- Some causes of heart failure in chronic rheumatic heart disease—Dr. Neil Feeney, Montreal.

Wednesday, June 21st—Continued

Nodules in relation to activity of rheumatic fever in childhood—Dr. R. R. Struthers, Montreal.

A short business session of the Canadian Rheumatic Disease Association will be held immediately after the close of this program.

Section of Surgery**WEDNESDAY, JUNE 21ST**

2.30 p.m.— Windsor Hall
End-results of chronic osteomyelitis after ten years (review of cases)—Dr. Edmond Dubé, Montreal.

A new surgical approach to the knee joint—Dr. V. O. Mader, Halifax.

Ambulatory treatment of fractures—Dr. Alexander Gibson, Winnipeg.

Acute intestinal obstruction—Dr. A. J. Grace, London.

Burns: treatment based on pathological physiology—Dr. R. A. Johnston, London.

The treatment of contracture due to burns—Dr. A. W. Farmer, Toronto.

The pathology and treatment of ischio-rectal abscess and fistula in ano—Dr. J. T. Danis, Toronto.

THURSDAY, JUNE 22ND

9.30 a.m.—

Extra-hepatic biliary growths, including malignant neoplasms—Dr. C. K. P. Henry, Montreal.

Bile-salt therapy in common duct drainage—Dr. A. L. Wilkie, Montreal.

The reasons for sub-total resection in cases of gastric and duodenal ulcer—Dr. Gavin Miller, Montreal.

Intractable gastric ulcer with final malignant change associated with benign tumour of the brain—Dr. P. H. T. Thorlakson, Winnipeg.

Spinal-cord complications in broken backs—Dr. E. H. Botterell, Toronto.

A contribution to the study of the surgical treatment of angina pectoris (illustrated by film)—Dr. Mercier Fauteux, Montreal.

Series of perforated peptic ulcers—Drs. Albert Ross, Montreal and Charles Letourneau, Montreal.

Section of Urology**WEDNESDAY, JUNE 21ST**

2.30 p.m.— Salon G
Metastases in malignancy of the genito-urinary organs—Dr. Max Ratner, Montreal.
Present status of tumours of the bladder—Dr. M. I. Seng, Montreal.

Wednesday, June 21st—Continued

The treatment of infiltrating tumours of the bladder, with special reference to cystectomy—Drs. Robin Pearse, Toronto and R. A. McComb, Toronto.

Unilateral multilocular cystic kidney with report of a case in a young child—Dr. W. A. Dakin, Regina.

Some observations and results of conservative renal surgery—Dr. N. E. Berry, Kingston.

4.00 p.m.—Round Table Conference, see p. 615.

THURSDAY, JUNE 22ND

9.30 a.m.—

The relative merits of intravenous and retrograde urograms—Drs. Gordon S. Foulds, Toronto and E. H. Shannon, Toronto.

Surgical treatment of the traumatic strictures of the urethra—Dr. Oscar Mercier, Montreal.

Urological conditions in children—Dr. J. Victor Berry, Ottawa.

Renal tuberculosis—Drs. H. D. Morse, Winnipeg, and D. L. Scott, Winnipeg.

Bilateral renal calculi—Dr. Grant Reid, Montreal.

11.00 a.m.—Round Table Conference, see p. 615.

SCIENTIFIC EXHIBITS

Pictorial case records in a group of epileptic cases—Dr. J. N. Petersen, Montreal Neurological Institute.

Carcinoma of the stomach—Drs. A. C. Singleton and J. Sommers, Department of Radiology, Toronto General Hospital.

Facial reconstructive surgery—Dr. Fulton Risdon, Toronto.

Uretero-sigmoid anastomosis and cystectomy—Drs. Robin Pearse, and R. A. McComb, Toronto General Hospital.

Pathological lesions of the urinary tract—Dr. Oscar Mercier, Hotel-Dieu Hospital, Montreal.

Surgical conditions of the thorax—Chest Service, Royal Victoria Hospital, Montreal.

Associated medical services, incorporated—Toronto.

Renal tumours—Dr. Emerson Smith, Royal Victoria Hospital, Montreal.

Recent advances in the study of varicose veins and ulcers—Dr. Josephus C. Luke, Royal Victoria Hospital, Montreal.

Fractures about the ankle—Drs. H. Dolan and H. F. Moseley, Royal Victoria Hospital, Montreal.

Kodachrome transparencies of gastro-intestinal conditions—Dr. Gavin Miller, Royal Victoria Hospital, Montreal.

Scientific Exhibits—Continued

Synergism and cancer—Dr. Cameron Gruner, Archibald Cancer Research Fund, McGill University, Montreal.

Le B.C.G. dans le Québec 1926-1939—Drs. Armand Frappier & L. A. Baudouin, Institut de Microbiologie et d'Hygiène, Université de Montreal, Montreal.

Diabetes mellitus—Staff of Clinic for Diabetes, The Montreal General Hospital, Montreal.

Ovarian tumours—Dr. P. J. Kearns, Women's Pavilion, Royal Victoria Hospital, Montreal.

Pneumococcus pneumonia—Drs. Montgomery and Richardson, The Montreal General Hospital, Montreal.

Skin diseases: moulages—Dr. Albéric Marin, Notre Dame Hospital, Montreal, P.Q.

The interrelation of systemic hæmatopoietic processes—Dr. Theo. R. Waugh, Pathological Institute, McGill University, Montreal.

The parasites of man in Canada—Dr. Thomas W. M. Cameron, Institute of Parasitology, McGill University, Macdonald College, P.Q.

Motion Pictures

The technique and principles of spinal anæsthesia—Dr. Kenneth M. Heard, Department of Anæsthesia, St. Michael's Hospital, Toronto.

Surgical treatment of traumatic stricture of the urethra—Dr. Oscar Mercier, Hotel-Dieu Hospital, Montreal.

A new surgical method to improve the blood supply to the heart—Dr. Mercier Fauteux, Department of Physiology, McGill University, Montreal.

Uretero-sigmoid anastomosis and cystectomy—Drs. Robin Pearse and R. A. McComb, Toronto General Hospital, Toronto.

Self-selection of diet experiment—Dr. Clara M. Davis, Winnetka, Ill.

Diseased and healthy conditions of the larynx—Dr. G. E. Tremble, Royal Victoria Hospital, Montreal.

Arthritis—Dr. Hagar Hethrington, St. Michael's Hospital, Toronto.

Subtotal gastric resection (Hofmeister-Finsterer modification of Billroth II)—Dr. Gavin Miller, Royal Victoria Hospital, Montreal.

The functional treatment of fractures—T. J. Smith & Nephew, Limited, Hull, Yorks, England.

ENTERTAINMENT FOR MEMBERS AND GUESTS

The various entertainment committees have been busy all winter arranging events medical and non-medical which are certain to have an appeal to visitors. There are four committees whose duties come under the heading of hospitality. These are: Entertainment, Ladies, Young People and Golf.

MONDAY, JUNE 19TH

12.30 p.m.—Luncheon, Windsor Hotel (Subscription \$1.00).

Chairman, Dr. T. H. Leggett.

Guest speaker, Hon. Mr. Justice E. Fabre Surveyer, Montreal.

8.30 p.m.—Public address, Ritz-Carlton Hotel, by Professor E. P. Cathcart, Professor of Physiology, University of Glasgow. (Under the auspices of the Committee on Nutrition of the Canadian Medical Association).

TUESDAY, JUNE 20TH

12.30 p.m.—Luncheon, Windsor Hotel (Subscription \$1.00).

Chairman, Dr. T. H. Leggett.

Guest speaker, Sir Arthur MacNalty, Chief Medical Officer, Ministry of Health, London, England.

7.30 p.m.—Dinner, Windsor Hotel. The members of General Council will be guests of the Quebec Division of the Canadian Medical Association (President, Dr. W. W. Lynch), The Montreal Medico-Chirurgical Society (President, Dr. J. R. Fraser) and La Société Médicale de Montréal (Président, Dr. Geo. E. Mignault).

WEDNESDAY, JUNE 21ST

1.00 p.m.—Luncheon, Windsor Hotel. (Subscription \$1.00).

Chairman, Dr. K. A. Mackenzie.

Guest speakers, Honourable J. H. A. Paquette, M.D., Provincial Secretary and Minister of Health.

His Worship the Mayor of Montreal, Camilien Houde, C.B.E.

8.30 p.m.—Annual General Meeting, Windsor Hotel, to which are invited all members and their ladies, guest speakers, official delegates and official guests. Presentation of medals and awards. Installation of President. Dress formal (not obligatory).

10.00 p.m.—Reception and Dance at the Chalet on Mount Royal. Buses will begin to leave the Windsor Hotel for the Chalet at 10.00 p.m., and will return guests to the Windsor Hotel later in the evening.

Wednesday, June 21st—Continued

NOTE.—A rigid city by-law stipulates that no motor vehicles are allowed on Mount Royal. The Montreal City Council has given permission to the Association to transport our guests via motor bus only on the night of this function. Visitors to the city are warned that they will be prohibited from driving their private cars to the Mountain on this night.

THURSDAY, JUNE 22ND

- 1.00 p.m.—Luncheon, Windsor Hotel. (Subscription \$1.00).
Chairman, Dr. F. S. Patch.
Guest speaker, To be announced.
- 10.30 p.m.—Supper Dance, Normandie Roof, Mount Royal Hotel. (Subscription \$2.50). The Normandie Roof has been reserved for the Association for this night. Lloyd Huntley's orchestra and a midnight floor show will entertain guests. A supper will be provided.

FRIDAY, JUNE 23RD

- 1.00 p.m.—Golf Tournament, Royal Montreal Golf Club, Dorval, Que. Tee off 1.00 to 3.00 p.m.
- 7.30 p.m.—Golf Banquet at the Royal Montreal Golf Club, to which all Association members are given a cordial invitation. The Ontario Cup and other prizes will be presented at the dinner.

Fees—Golf tournament only	\$2.00
Golf Banquet	3.00
Total	\$5.00

This will include green fees, dinner and refreshments.

Information as to transportation will be available at the Golf Committee's reception desk in the Windsor Hotel.

Ladies' Entertainment

There will be a special registration for ladies. They are requested to register as soon as possible after their arrival.

There will be an information booth for ladies only, at which full information may be obtained on all local activities.

Opportunities for golf, tennis, shopping and sightseeing will be provided.

MONDAY, JUNE 19TH

- 10.00 a.m.—Registration.
- 4.00 p.m. to 6.00 p.m.—Tea for wives of members of the General Council at the home of Mrs. F. S. Patch, 3156 Westmount Boulevard.
- 8.30 p.m.—Ritz-Carlton Hotel. Address by Professor E. P. Cathcart, of the University of Glasgow, Scotland.

TUESDAY, JUNE 20TH

- 1.30 p.m.—Luncheon for wives of members of General Council, at the Forest and Stream Club, Dorval.
- 7.30 p.m.—Dinner for wives of members of General Council at Windsor Hotel. Hostesses: wives of members of the Quebec Division of the Canadian Medical Association.

WEDNESDAY, JUNE 21ST

- 9.00 a.m. to 4.00 p.m.—Registration.
- 1.30 p.m.—Luncheon at Laval-sur-le-Lac Golf Club.
- 4.00 p.m.—Garden Party at "Bessarabia", residence of Mrs. Arthur Drummond, Beaconsfield, Que.
- 8.30 p.m.—Annual General Meeting at Windsor Hotel.
- 10.00 p.m.—Reception and Dance at the Chalet on Mount Royal.

THURSDAY, JUNE 22ND

- 9.00 a.m.—Three-hour Sightseeing Drive, with coffee at Habitant Tea Room, Cartierville, Que.
- 4.00 p.m.—Garden Party at "Yorkshire House", residence of Mr. and Mrs. W. M. Birks, Mount Bruno, Que.
- 10.30 p.m.—Supper Dance, Normandie Roof, Mount Royal Hotel.

FRIDAY, JUNE 23RD

- 2.00 p.m.—Three hour drive to the Beaver Restoration Colony.

Young People's Entertainment

Young people attending the convention with their parents will be interested to know of the plans that have been completed for their entertainment while in Montreal. The program has been especially designed for those of teen-age and includes many features of interest. On one day a sightseeing autobus tour will be made to all the principal places of interest around the city, announcers accompanying each bus to point out the features of historical and architectural interest. On another day there will be tours of inspection of various industries. Playing privileges have been arranged with city tennis and golf clubs for those interested in these games.

The Committee has arranged to spend one whole day at the Domaine d'Esterel in the Laurentian mountains. This last is one of the show places among Eastern Canada's play spots, and we are more than fortunate in having an opportunity of taking our young visitors there. A very reasonable rate has been extended which will allow the entire use of the many entertainment facilities, and the day there will be a memorable one. Indeed, it is quite possible that many of the ladies will wish to make the trip, and our plans are prepared for this eventuality. Incidentally, the

young people's program is being planned to allow them to participate in the social program of the adult members whenever this is possible.

WEDNESDAY, JUNE 21ST

9.00 a.m. to 12 noon.—Registration.

There is a special registration desk for the young people.

Admission to the various activities on the young people's program is largely by ticket and it is requested that the visitors decide upon the various items they wish to attend and that they secure their tickets for these from the registration clerks at the time of registration.

2.30 p.m.—Round-the-City Tour.

Buses leave the Windsor Street entrance of the Windsor Hotel at 2.30 p.m. The tour which will visit all the principal points of interest in the city will be followed by afternoon tea at the Windsor Hotel.

10.00 p.m.—Reception and Dance at the Chalet on Mount Royal.

Buses will leave the Windsor Hotel from 10.00 p.m. on.

THURSDAY, JUNE 22ND

9.30 a.m.—Domaine d'Esterel Excursion.

Buses leave the Windsor Street entrance of the Windsor Hotel for the Domaine d'Esterel in the Laurentian Mountains where the whole day will be spent, returning in the evening in time to attend the supper dance at the Normandie Roof in the Mount Royal Hotel.

FRIDAY, JUNE 23RD

10.00 a.m.—Commercial tours.

Buses will leave the Windsor Street entrance of the Windsor Hotel for the following places of interest:—

- (1) A Candy Factory (Walter M. Lowney, Ltd.).
- (2) An Ice Cream Factory (Elmhurst Dairy).
- (3) A Ginger Ale Factory (Charles Gurd & Co. Ltd.).



A Panoramic View of Montreal

Friday, June 23rd—Continued

- (4) The Bell Telephone Building. A very interesting collection of working models and of motion pictures, illustrating the mechanisms used in the transmission of sound, are on view. Incidentally, from the top of the Telephone Building an unsurpassed view of the City of Montreal is obtained.

The accommodation on these trips is limited, and those having a particular preference are advised to apply early.

Tennis and Golf

Playing privileges in the mornings have been extended by the Mount Royal Tennis Club, 2106 Grey Avenue. Tea, lunch or dinner can be obtained at the clubhouse.

Those wishing to play golf may obtain introductions to various city clubs on application to the Registration Desk.

Committee in Charge of Local Arrangements

Chairman, DR. F. S. PATCH

Secretary, DR. A. W. YOUNG

Drs. A. R. Bazin, A. T. Bazin, G. A. Copping, Neil Feeney, L. Gérin-Lajoie, J. Keith Gordon, Keith Hutchison, B. S. Johnston, D. S. Lewis, W. W. Lynch, S. J. Martin, J. C. Meakins, E. S. Mills, L. C. Montgomery, D. McEachern, J. W. Macleod, J. V. V. Nicholls, F. G. Pedley, L. J. Rhea, P. G. Rowe, F. McIver Smith, C. J. Tidmarsh, G. E. Tremble, R. V. Ward and T. R. Waugh.

Sub-Committees of Committee on Arrangements**ANNUAL GENERAL MEETING**

Chairman, DR. A. T. BAZIN

Secretary, DR. B. S. JOHNSTON

BADGES AND SIGNS

Chairman, DR. G. E. TREMBLE

Secretary, DR. J. V. V. NICHOLLS

Drs. Armand Gratton, E. A. Stuart and A. T. Thom.

COMMERCIAL EXHIBITS

Chairman, DR. A. T. BAZIN

Drs. Louis Bernard, Rupert Derome, George Fleet and S. L. Richardson.

ENTERTAINMENT

Chairman, DR. J. KEITH GORDON

Secretary, DR. D. McEACHERN

Drs. David Ballon, H. S. Dolan, C. W. Fullerton, L. H. Garipey, A. T. Henderson, P. N. MacDermot, J. F. McIver, J. W. Mackay, Ivan Patrick, N. W. Philpott, J. B. Ross and N. T. Williamson.

ENTERTAINMENT, MEDICAL WOMEN DELEGATES

Convener, DR. JESSIE BOYD SCRIVER

GOLF

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The Cancer Campaign

The Cancer Bill in Great Britain

The Right Honourable Doctor Walter Elliott, Minister of Health for Great Britain, speaking in the House of Commons on the Cancer Bill which was before the House some weeks ago, made some interesting observations. He said that cancer had now become second on the list of fatal diseases in the country. The annual number of deaths from the disease had been steadily mounting and the total for Great Britain in 1937 was 74,000. Of the total deaths from all causes during the working period of life (that is between the ages of 15 and 65 years) 17 per cent were due to cancer. Nearly one-half the deaths (48 per cent), occurred under

the age of 65 years, while about 10,000 occurred under the age of 55 years, when working or business capacity was at its fullest and when the heads of families are most necessary to their children.

The annual death rate per million of the population in Great Britain was 835 in 1901 and 1,624 in 1937. Thus the rate had nearly doubled in the course of the generation.

Dr. Elliott went on to say that no one could deny the urgent necessity for some means of bringing adequate facilities for the treatment of cancer within the range of everyone, although there was an obvious field for increased research into prevention and causation of cancer, and that, during the past year, substantial progress in this direction had been made. The available means of treatment—surgery, radium and x-rays—if they are to bring about the greatest degree of success must be employed when the disease is in the early stage. There must, therefore, be ample facilities for early diagnosis and adequate treatment.

From investigations which the Minister had been able to make it appeared that only about one-quarter of the patients in the land who could be treated with advantage obtained treatment at centres which were adequately equipped and staffed. By that, he meant centres having expert surgeons, expert radium therapists, and a sufficient quantity of radium and x-ray apparatus. It is true that not all remaining cancer patients are susceptible to treatment but more might become so if the facilities were improved. Some of these cases, for example, belong to the large group of cases of intestinal cancer of which symptoms were so indefinite that they were neglected until the disease was too far advanced. For such cases the problem was not so much the provision of treatment as promotion of that earlier diagnosis which was so vital.

In the United Kingdom the Cancer Bill proposes to attempt to secure that no one, wherever domiciled in the land, who is suffering or suspected by his doctor to be suffering from cancer, would be out of easy reach of the best available advice. Further, everyone would be able to obtain admission to an appropriate hospital, whether for further examination or for whatever treatment was best suited to his condition. The Bill provides for the organization by County and County Borough Councils throughout the country for the diagnosis and treatment of cancer.

The Minister was careful to say that this was not a Radium Bill but that it was a Cancer Bill. It aimed at bringing the whole range of treatment by every means of proved efficacy within the sphere of every person in the United Kingdom. The proposals would involve the expenditure of money and would be financed by local and central authorities in conjunction with each other. Financial assistance would be available by grants from the exchequer. It was

estimated that the exchequer contribution, when the service was in full operation (which would probably be some five years hence) would amount to approximately £300,000 per annum for England and Wales, and £50,000 for Scotland.

Turning to the provision of radium and other radio-therapeutic substances, Dr. Elliott said that adequate radium for the United Kingdom would be secured. It is interesting to note that, in this connection, the Honourable Minister proposes to endeavour to secure \$1,000,000 worth of radium from Canada through the Eldorado Gold Mines of Port Hope, Ontario.

An interesting feature of the Bill prohibits the publication of misleading advertisements offering treatment and cures for cancer. Such advertisements are not now accepted by the two great newspaper organizations in the country, both of which had informed the Minister of their hearty support of the proposed clause.

The Minister was able to assure the House that competent bodies such as the Imperial Cancer Research Institute, the Royal Colleges of Physicians and Surgeons, and the British Empire Cancer Campaign, etc., had assured him of their whole-hearted support of the Bill. The *British Medical Journal* of the issue of December 17, 1938, from which we have taken the liberty of extracting this report, has much more to say about the full debate which took place in the House in respect to the Bill. Space does not permit of further reference to this, but members to whom it may be available will find it extremely interesting.

In addressing the British Medical Association Council Dinner in London recently, the Right Honourable Walter Elliott, M.D., Minister of Health in Great Britain, announced that negotiations were proceeding to purchase \$1,000,000 worth of radium (11 grams) from the Eldorado Gold Mines, Port Hope, Ontario. This is part of the plan to purchase two and one-half million dollars worth of radium to be used by the Ministry of Health in a nation-wide attack on cancer.

Not long since, the United States appropriated under Government control many millions of dollars to be applied to the fight against cancer.

Throughout the world there appears to be a growing conviction that cancer should be fought on a wide front, and that national resources should be available for the attack. In all lands cancer continues to be close to the top of the list of death-dealing agencies. It is not strange, therefore, that so much attention is being directed towards combating it.

It is announced that the Canadian Society for the Control of Cancer has been affiliated with the British Empire Cancer Campaign.

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W. Ross; *Pathology*, Dr. Wm. Boyd; *Ophthalmology*, Dr. W. R. F. Luke; *Oto-laryngology*, Dr. Basil Bradley; *Preventive Medicine and Hygiene*, Dr. C. D. Farquharson; *Pædiatrics*, Dr. Miriam Brick; *Obstetrics and Gynæcology*, Dr. John Mann; *Anæsthesia*, Dr. Ellen Blatchford; *Neurology and Psychiatry*, Dr. C. H. McCuaig; *Urology*, Dr. E. B. Hardy.

E. W. MITCHELL,
Hon. Secretary.

The Calgary Medical Society

At a special meeting of the Calgary Medical Society held on May 9, 1939, the President, Dr. M. G. Cody, welcomed Dr. L. J. O'Brien, President-elect, of the Alberta Division of the Canadian Medical Association. Dr. O'Brien addressed the members on the subject of health insurance. Dr. R. B. Francis, a member of the Council of the College of Physicians and Surgeons of Alberta, followed, and reviewed the work being done by the Council of the College of Physicians and Surgeons and also gave a very thorough summary of the question of health insurance in European countries. Following these addresses, there was a discussion of this problem by the members of the Society.

At the final meeting of the 1938-39 session of the Calgary Medical Society held on April 11, 1939, Dr. J. W. Richardson gave an interesting address on "The liver and bile ducts" with special reference to certain surgical procedures.

The following officers were elected for the 1939-40 session: *President*, Dr. M. G. Cody; *Vice-president*, Dr. W. E. Ingram; *Secretary*, Dr. L. M. Mullen; *Librarian*, Dr. R. R. Hughes; *Executive Committee*, Drs. J. W. Richardson, J. V. Follett and F. Pilcher.

G. E. LEARMONTH

Medical Societies

The Academy of Medicine, Toronto

The thirty-second annual meeting of the Academy of Medicine, Toronto, was held in Osler Hall on May 2, 1939. The report of the Honorary Secretary, Dr. S. J. Newton Magwood, showed the total fellowship to be 1,132. The reports from the various officers and committees reviewed the many activities of the past year.

The library now contains 27,932 volumes, an increase of 757 for the past year. The Academy appreciates gifts from its own Fellows and from friends interested in its endeavour to build up a worth-while medical library and museum.

The Academy was fortunate in hearing addresses from a number of distinguished visiting physicians and surgeons from Europe and the United States. Very interesting and varied programs were presented at the stated, special and sectional meetings, and subjects of particular interest to the profession and public alike were discussed.

Dr. Cameron A. Warren, the retiring president, was highly complimented on his successful year in office.

The election of new officers and members of Council resulted as follows: *President*, Dr. D. E. Robertson; *Vice-president*, Dr. William Magner; *Hon. Secretary*, Dr. E. W. Mitchell; *Hon. Treasurer*, Dr. James W. Ross. *Elective Members of Council*.—Drs. R. E. Davidson, J. Z. Gillies, Angus MacKay, J. R. Stewart, A. E. Sutton and Roy H. Thomas (for a two year period); Drs. R. J. W. Brooke, G. W. Carleton, E. E. Cleaver, C. E. Cooper Cole, R. I. Harris, R. M. Janes and Gilbert Parker (for one year). The following were elected *Chairmen of Sections*.—*Medicine*, Dr. E. J. Trow; *Surgery*, Dr. James

The Canadian Rheumatic Disease Association, Quebec Division

A meeting was held on May 12th, in the Montreal Neurological Institute, with Dr. R. R. Struthers in the chair. The paper of the evening was presented by Dr. W. McLellan on the subject "Bacteriology of rheumatic fever". A very fine historical review was outlined, and the paper concluded with a summary of the recent work done in this field.

The election of officers resulted as follows: *Chairman*, Dr. Albert DeGuise; *Secretary*, Dr. L. J. Adams; *Treasurer*, Dr. J. H. Palmer.

Dr. Douglas Taylor, President of the Canadian Rheumatic Disease Association, outlined briefly the aims and objects of the Association, and its development to date. It was pointed out that the Association is encouraging an organized and correlated study of the rheumatic disease problem, including rational methods of treatment of the various types of arthritis.

Announcements were made concerning the annual sectional meeting with the Canadian Medical Association, to be held on June 21st (Wednesday), at 2.30 p.m. The program will consist of two papers on some aspects of "Rheumatic fever", by Drs. R. R. Struthers and Neil Feeney, and two papers dealing with "Chronic arthritis", by Drs. J. A. Nutter and W. S. Barnhart. Discussion of the papers will be opened by prominent workers in this field, so that the meeting promises to be interesting and instructive.

Nova Scotia Medical Society, Halifax Branch

The annual meeting of the Halifax Branch of the Nova Scotia Medical Society, marking the close of clinical activities for the summer months, was held in April, following the annual dinner. The president, Dr. C. W. Holland, was in the chair.

Officers elected for the following year were: *President*, Dr. C. E. Kinley; *Vice-president*, Dr. D. J. MacKenzie; *Secretary-Treasurer*, Dr. C. M. Bethune; *Executive and representatives to the Provincial Society*, Drs. H. D. O'Brien, A. L. Murphy, A. G. MacLeod, K. M. Grant.

Letters, Notes and Queries

Prevention of Silicosis by Metallic Aluminum

To the Editor:

We wish to comment on an article by Denny, Robson and Irwin, "The prevention of silicosis by metallic aluminum", which appeared in the March, 1939, issue of the *Journal*. We are interested mainly in the change of interpretation by the authors, who now attribute the action of their protector dust (aluminum), in part, to its flocculating effect on colloidal silica. The theory of flocculation of silica in the lung by protector dusts was advanced by Emmons and Wilcox in 1936.¹ When, shortly after, the first paper by Denny, Robson and Irwin appeared, attributing the protective effect of aluminum to its ability to "inhibit solubility" of silica, the theory of flocculation was again discussed in 1938 by Emmons and Fries.² In disagreeing with Denny, Robson and Irwin, it was brought out that Banting and others, comprising a preponderance of opinion, stress the importance of particulate silica. The principle underlying the efficacy of aluminum was examined, and it was concluded that flocculation and removal of silica from suspension and

"solution" as it hydrated were the chief factors involved.

Denny, Robson and Irwin, in still relying, in part, on solubility, confuse the question by the phrase, "as we define solubility". They define solubility as that silica which shows in the chemical test they used for silica. But the test they used reacts only with silica in solution and not with particulate silica. In other words, their definition of solubility is that of the dictionary. They still explain their finding in large part on this basis, contrary to a mass of evidence. Banting³ has pointed out in this *Journal* that "Silica in solution can be readily transported in the blood stream—and does not produce fibrosis".

In their second article, Denny, Robson and Irwin agree that flocculation and removal of silica from solution by hydrated alumina may be factors contributing to protection. Their chief contention is that hydrated alumina "inactivates" silica by forming an insoluble coating which prevents its hydration. The evidence they present is of a negative nature. It is undoubtedly true that silica adsorbs alumina, as they have well shown, for adsorption is necessarily a mutual phenomenon. That such adsorption can prevent hydration of silica, however, it hardly tenable in the light of known facts.

For many years it has been recognized by geologists that during the weathering of silicate- and silica-bearing rocks alumina is extremely stable, but silica is removed. The end-product of such weathering is an aluminous laterite, bauxite. Therefore it does not seem plausible that alumina can make silica immune to hydration. In fact, our findings indicate to us that such hydration takes place in the beaker.

The evidence favours the view that neutralization of the silica charge by alumina, or flocculation, is to be stressed as the dominant factor.

The true picture of industrial dust inhalation and its effects is not complete until the principles of protection are understood and agreed upon. Since other protector substances have been reported prior to the work of Denny, Robson and Irwin, aluminum is one more substance on such a list.

1. EMMONS, R. C. AND WILCOX, R.: *Am. Mineral.*, 1937, **22**: 256. This paper was presented at the annual meeting of the Mineralogical Society of America, in Cincinnati in December, 1936, after two years' work, at which time it was reported by the press.
2. EMMONS, R. C. AND FRIES, C.: *Am. Mineral.*, 1938, **23**: 654.
3. BANTING, F. G., *Canad. M. Ass. J.*, 1936, **35**: 289.

R. C. EMMONS,
CARL FRIES.

University of Wisconsin,
Madison, Wis.,
April 5, 1939.

Answers to letters appearing in this column should be sent to the Editor, 3640 University Street, Montreal.

Abstracts from Current Literature

Medicine

Various Methods of Determining the Early Diagnosis of Arteriosclerosis in Diabetes. Kramer, L. I.: *New Eng. J. Med.*, 1939, 220: 278.

The chief cause of death in diabetes has shifted from coma to arteriosclerosis. Why the diabetic should be more vulnerable to cardiovascular changes than a person without the disease is still unknown.

One hundred cases selected at random from the Diabetic Clinic at the Rhode Island Hospital were studied. Blood-sugar and blood-cholesterol determinations were made in each case. The extremities were x-rayed, and the degree of calcification was noted. The fundi, especially the retinal vessels, were studied. The pulsations of the dorsalis pedis and posterior tibial arteries were recorded. Oscillometric tracings were taken, and cutaneous histamine reactions observed in all suspected cases.

Taking this group as a whole, 38 per cent of the cases showed arteriosclerosis. There were no cases in the first and second decades. In the third decade the incidence is 8 per cent, in the fourth decade 17 per cent, and so on till the ninth decade, where the incidence is 100 per cent. A considerable portion of vascular disease can be attributed to normal degenerative changes relevant to age.

Of this group 18 per cent gave a systolic pressure reading higher than 150, no patient under 30 having a blood pressure above normal. Of those showing evidence of sclerosis 28 per cent had hypertension.

Ninety-two per cent of the group gave blood-sugar readings higher than 120 mg. while only 85 per cent of the patients with arteriosclerosis had blood-sugar values higher than 120 mg.

Observers have believed that there is a relation between blood lipids and arteriosclerosis. Only 23 per cent of the total cases and 21 per cent of the arteriosclerotic cases gave readings higher than 225 mg.

X-ray studies of the lower extremities showed deposition of calcium in the blood vessels in 24 per cent of the group and in 63 per cent of the arteriosclerotic group. Advanced sclerosis may exist without one's being able to demonstrate such deposition roentgenologically, as evidenced by the 14 cases with negative x-ray findings but with other indications of vascular damage.

Five patients showed evidence of cataract formation. Twenty-three per cent of the entire group had retinal lesions. Only four of the patients under fifty showed retinal changes.

The histamine intracutaneous test was carried out on 34 of the arteriosclerotic patients. In 67 per cent of the cases the reaction was

normal; 17 per cent showed a delayed response. In 12 per cent the reaction was minimal, and in 6 per cent it was absent. All the patients except two who showed a normal response to histamine had a normal oscillometric tracing. The test gives information as to the potency of the capillaries and peripheral circulation, and indirectly tells something about the status of the deep and large vessels.

LILLIAN A. CHASE

Spontaneous Mediastinal Emphysema. Hamman, L.: *Bull. Johns Hopkins Hosp.*, 1939, 64: 1.

The author records 8 cases of spontaneous interstitial emphysema of the lungs and mediastinum and summarizes the important symptoms. (1) Interstitial emphysema may occur without effort. (2) The patient may complain of severe pain, usually located beneath the sternum, sometimes radiating to the back and at others to the neck, shoulders or arms. (3) There is often a sense of pressure or of expansion beneath the sternum. There is no shock and temperature, pulse and respiratory rates, blood pressure and the leucocyte count are very little if any altered. (4) In many instances there is a peculiar and distinctive sound over the heart, heard usually during systole but occasionally in diastole. (5) The area of cardiac dullness is diminished or obliterated and replaced by a hyperresonant percussion note. (6) Pneumothorax often occurs, but is small and often not detected until x-rays are taken. (7) When air occurs in the subcutaneous tissues of the neck the diagnosis is at once assured.

S. R. TOWNSEND

Surgery

The Prognostic Significance of Pre-operative Investigation of the Vital Capacity. Lassen, H. K.: *Acta Chirur. Scand.*, 1938, 81: 343.

In their hospital at Copenhagen for many years examinations of the heart by electrocardiograph and x-ray have been done with the intention of obtaining information of prognostic value before operation. In 464 patients with surgical conditions they have performed vital capacity tests on all except 12 whose mental condition was such as to preclude its reliability; 359 of these were operated upon. Lassen states he was unable to find more than one other reference in the literature (Mayo Clinic, 1924) in which this test had been performed on a group of surgical patients, and in that reference the conclusion had been that clinical opinion was of more value than the results obtained from the test except that this was of use with lung and heart disease. Factors which influence the vital capacity are given as volume of air (temperature, humidity, barometric reading), age, sex, race, climate, position (standing, sitting, lying), occupation, degree of energy, medicine, constrict-

tion of the trunk and many organic diseases. In taking these readings Krogh's spirometer was used and the mean of 4 to 5 readings taken. Lassen gives considerable detail of their observations. Post-operative pneumonias occurred as frequently without lowered vital capacity, but infarct, embolism and phlebitis were less common. Ordinary examination of the heart was able to predict one death, electrocardiography 5, x-ray of the heart 7, and lowered vital capacity 8. In deaths from circulatory insufficiency with lowered vital capacity this occurred 5.2 times more frequently; when only one test is pathological it occurred 4.6 times more frequently, but when all 3 tests are pathological it occurred 12 times more frequently. His suggestion is, with pathological tests from electrocardiography, x-ray and vital capacity, pre-operative treatment should be given and operation performed with expediency and as lightly as possible.

FRANK DORRANCE

The Influence of Various Operations and Post-operative Complications on Vital Capacity.
Lassen, H. K.: *Acta Chirur. Scand.*, 1938, 81: 361.

A considerable number of reports have been made on vital capacity after operation. Lassen's conclusions approximate those of American writers, except that the normal values are more slowly obtained in their clinic, for which he offers no explanation. On all upper abdominal cases its values received 24 hours after operation were approximately 45 to 60 per cent of the pre-operative values. With imminent pulmonary complications the values continued to fall. Lassen used vital capacity readings as an indication for beginning treatment. He considers that reflex muscular spasm plays a part in the lowering of the values. The fall is generally less in low abdominal operations. In extremity work there is slight if any decrease. The various kinds of narcosis and anaesthesia had slight influence.

FRANK DORRANCE

Obstetrics and Gynaecology

Uric Acid Metabolism in Eclampsia. Cadden, J. F. and Stander, H. J.: *Am. J. Obst. & Gyn.*, 1939, 37: 37.

A summary of 5 cases of eclampsia shows that this disease is not associated with decreased excretion of uric acid and that the high blood uric acid which invariably accompanies the disease is probably due to impaired destruction of this substance in the liver. This impairment appears very early in the disease and may perhaps be of assistance in our search for the etiology of eclampsia. In any event, it appears as additional evidence that eclampsia is the outcome of a metabolic disturbance, and probably in one or other phase of nitrogen metabolism.

ROSS MITCHELL

The Treatment of Myoma. Werner, P.: *J. Obst. & Gyn. of Brit. Emp.*, 1938, 45: 780.

The author makes an extensive review of myoma of the uterus. The danger of malignant degeneration is small—1.5 to 5 per cent. The menopause is often delayed six to eight years because of growing myomata in the uterus. The main difference between cases for radiation and operation are clearly given. Only those patients who are suffering from profuse but regular menstruation are suitable for radiation. All other patients in whom irregular bleeding, discharge, pain and fever, are present are not suitable for radiation and must be operated upon. The contraindications for radiation are: (1) Uncertain diagnosis, such as a large cervix obscuring the size of the uterus; ovarian tumours adherent to the uterus and mistaken for it; (2) suspicion of malignancy, such as growth and softness. The combination of carcinoma of the corpus and myoma should be suspected if there is irregular bleeding, bloody, foul-smelling discharge, loss of weight, ill appearance. Where the myoma grows rapidly one must consider sarcomatous change. One must also consider myoma with pregnancy where there is rapid enlargement; (3) sub-mucous myoma should not be radiated because of danger of surface necrosis; (4) incarcerated myoma should not be radiated because of reactive swelling and pressure dangers; (5) all varieties of degeneration such as necrosis, infection, circulatory degenerative changes should not be radiated; (6) myoma with accompanying fever and inflammation; (7) very large myomata are better operated upon, because the tumour shields the ovaries from radiation; (8) myomata with pregnancy are out of the radiation class.

The author does not agree that radiation stops sarcomatous growth in myomata. He also reminds his readers that the myomata associated with pregnancy often become reduced in the late puerperium and may later disappear. The same is true after the menopause.

P. J. KEARNS

Pædiatrics

Clinical Experience with Sulfapyridine (Dage-nan). McColl, W. A.: *J. Pædiat.*, 1939, 14: 277.

Clinical success with this drug has been reported in cases of pneumonia in adults. The present report deals with 33 patients ranging in age from 1 week to 13 years. The most successful results were obtained in 13 pneumococcal infections. Eight of these had lobar pneumonia. They all showed marked improvement within 48 hours, regardless of the day of the disease on which treatment was begun. One case of pneumococcal bacteriæmia, 1 of peritonitis, and 3 of empyema all were successfully

treated. Ten cases of bronchopneumonia were treated with three deaths. Of the remaining miscellaneous cases osteomyelitis and meningitis responded well. Two staphylococcal infections did not respond.

The following dosage table was used: 1 to 3 months, 0.8 grams daily; 6 to 14 months, 1.5 grams daily; 3 years, 2.0 grams daily; 5 years, 3.0 grams daily. Toxic reactions were not severe. Twenty-eight had nausea and vomiting during treatment. Diarrhoea appeared in one case and cyanosis in three. Methæmoglobin was reported in several and sulphæmoglobin in one. Frequently patients lost from 10 to 20 per cent hæmoglobin during treatment. Granulocytopenia was noted once.

The results in this series indicate that a blood concentration of approximately 2 mg. per cent is sufficient. The drug was particularly effective in pneumococcal infections.

REGINALD A. WILSON

Differential Diagnosis of Non-rheumatic "Growing Pains" and Sub-acute Rheumatic Fever. Shapiro, M. J.: *J. Pædiat.*, 1939, 14: 315.

In this article the author draws attention to the confusion which exists between growing pains and mild arthritis due to rheumatism. He contends that in our desire to make an early diagnosis of rheumatic fever many children with non-rheumatic pains have been mistakenly diagnosed and treated as cases of sub-acute rheumatic fever. It is the author's experience that the great majority of children with pain in the extremities are not suffering from true rheumatism. Moreover, since 84 per cent of cardiac cases gave a history of definite acute polyarthritis it should not be necessary to accept a story of growing pains alone to explain the development of rheumatic heart disease.

The clinical picture of the two entities is compared and contrasted. True rheumatic joint pains are confined to the joints and their onset usually follows some upper respiratory infection. They involve upper and lower extremities, are worse during the day, and tend to improve on going to bed. Nosebleeds, skin rashes, and fever are common accompaniments. Growing pains, on the other hand, tend to come on towards the end of the day and become worse at night time. These pains are in the legs and thighs and the joints themselves are never warm, tender or swollen. Unlike rheumatism, they are not accompanied by fever, rash or increased sedimentation rate.

In the vast majority of cases, it is claimed a clear cut differentiation can be made on clinical grounds and so many children with painful extremities can be separated from those who must be kept under close observation for the development of rheumatic carditis.

REGINALD A. WILSON

Therapeutics

Mode of Action, Clinical Use and Toxic Manifestations of Sulphanilamide. Long, P. H., Bliss, E. A. and Feinstone, W. H.: *J. Am. M. Ass.*, 1939, 112: 115.

The authors have made further observations on the action of sulphanilamide which leads them to believe that the drug decreases the rate of multiplication of susceptible bacteria, a bacteriostatic action. The proper clinical use of sulphanilamide must be based on a knowledge of factors concerned in its absorption and distribution in the body. They feel that levels of the drug of from 10 to 15 mg. per cent of blood are favourable for the control of severe infections. Lower levels, from 5 to 10 mg. per cent are satisfactory for the control of mild or moderately severe infections. The maintenance of an even level is dependent on dosage over the entire 24-hour period.

Sulphanilamide has many toxic effects and they recommend hospitalization and careful supervision. This supervision should consist of careful clinical observations, frequent and regular temperature recordings, a daily hæmoglobin determination and a daily total white blood cell count. They feel that if these procedures are adhered to routinely that the toxic manifestations of sulphanilamide will be noted in their inception.

S. R. TOWNSEND

Treatment of Gonorrhœa by Uleron. Wilkie, C. H.: *Brit. M. J.*, 1939, 1: 57.

One hundred and twenty male cases were treated, including twenty chronic infections which had not responded to irrigation. The method was to give short courses and to repeat these twice more if cure was not obtained. No case was treated until a preliminary period averaging 17 days had elapsed. Daily irrigations of 1/10,000 potassium permanganate accompanied all chemotherapeutic medication. Each course was for three days, totalling 11 grams, given 3 grams the first day and 4 the succeeding two. The interval between the courses was 9 to 11 days. The results in the acute cases showed that after one course 26 per cent were cured, after a second a further 35 per cent, and after the third 13 per cent, making a total of 74 per cent. There were some failures and some relapses. Compared with a hundred previous cases cured by other means the average duration was only 35 days in the uleron-treated cases and 15 weeks in the controls. Five of the 20 chronic cases were uleron failures. With the dosage employed and the treatment given in short courses no severe toxic symptoms developed, and especially no polyneuritis, which is one of the reasons why uleron has received less trial in England than on the continent. Uleron does not protect against a fresh infection. Contrary to certain others the author has found this drug better than sulphanilamide,

which in his hands needed large doses over long periods, with accompanying toxic effects.

A. BRANCH

Pathology and Experimental Medicine

Urinary Diastase in Acute Pancreatic Necrosis: An Experimental Investigation. Smith, C. J.: *Ann. Int. Med.*, 1938, 12: 932.

After noting a present tendency towards the non-operative management of acute pancreatic necrosis the author draws attention to various publications commenting favourably on the value of urine diastase determinations in the diagnosis of that condition. The diastase test, which consists in adding a starch solution to various dilutions of the patient's urine and later testing for its disappearance with iodine, gives normal values (expressed in units) as 4 to 32, with higher readings in cases of pancreatic necrosis. The test is simple and quickly done and, while not infallible, may prove of considerable aid in deciding between pancreatic lesions and other abdominal catastrophes. It becomes positive within eight hours of the onset of the disease and often returns to normal by the third day. Common duct stone and acute cholecystitis have given false positive results. A normal urinary diastase value is considered to exclude pancreatic necrosis.

In eleven dogs in whom the author set up acute pancreatic necrosis by injecting mercury into a pancreatic artery a significant increase in the urinary diastase occurred in eight. In some the increase was very great.

G. A. COPPING

The Nature of the Human Factor in Infantile Paralysis; Peculiarities of Growth and Development. Draper, G. and Dupertuis, C. W.: *J. Clin. Investigation*, 1939, 18: 87.

The authors used a method composed of mensuration, observation and statistical analysis in order to study the external morphology of subjects with infantile paralysis. They found that persons susceptible to the virus of this disease possess a special constitutional type of morphology which differs significantly from that of the unsusceptible. Variations occur in the degree of morphological differences, extending from nearly imperceptible ones to those of high statistical significance. The scale may parallel the severity of the individual illness, and, likewise possess epidemiological significance. Among susceptibles there is a lack of coordination between growth and development. This is expressed in a tendency to overgrowth and retarded development. The peculiar presence of the mongoloid eye and the fetus- and infant-like retardation of the eye-nose zone suggest adverse genetic or intrauterine forces. The person susceptible to infantile paralysis is a

different and in some ways incomplete phenotype, the incompleteness depending on certain faulty genetic characters or adverse uterine events which alter the time relationships in the processes of growth and development.

JOHN NICHOLLS

The Gastric Secretion in Chronic Alcoholic Addiction. Seymour, W. B., Spies, T. D. and Payne, W.: *J. Clin. Investigation*, 1939, 18: 15.

The gastric secretion in 40 chronic alcoholic addicts was studied, histamine being used as the secretory stimulant. There was no clinical evidence of vitamin deficiency and no laboratory evidence of anemia. The results showed an average diminished secretory volume and an average diminished acidity, but the peptic activity of the gastric juice was apparently unimpaired. Comparison of the incidence of the achlorhydria which was found, with the normal expected incidence for the various age-groups showed considerable increase of achlorhydria over the normal. Comparison of the incidence of achlorhydria in the present series of alcoholics with polyneuritis in which histamine had been used as a secretory stimulant showed that the percentage with achlorhydria was much higher in the latter group.

JOHN NICHOLLS

Oto-rhino-laryngology

The History of Cancer of the Larynx. Sir StClair Thomson: *J. Laryngol. & Otol.*, 1939, 54: 33.

The author points out that while during twelve years deaths in Britain from tuberculosis have decreased by 30.01 per cent those from cancer have increased by 27.75, the population increase being 5.01, and that laryngeal cancer increased faster than other kinds. He distinguished laryngeal cancer as: intrinsic, or simply cancer of the larynx; and extrinsic, or cancer of the hypopharynx, leaving the disease in the epiglottis as an entity by itself.

Cancer of the larynx is treated in following ways: (a) by removal of the growth by laryngo-fissure; (b) removal by laryngectomy; (c) removal by lateral pharyngotomy; (d) the removal of glands; and (e) treatment by radium and x-rays.

The first laryngo-fissure for intrinsic cancer was performed by Gurdon Buck in America in 1851, giving the patient a respite of fifteen months. After discovery of laryngoscopy, the first successful laryngo-fissure was done by Douglas Gibb (Britain) in 1864. The patient died of recurrence in a year. As late as 1883 Butlin saw no inducement to perform the operation of thyrotomy for the removal of carcinoma, whether extrinsic or intrinsic. After years of perseverance, however, Gluck and Soerensen reported in 1930 that up to that time they had had 110 lasting cures out of 125

cases, and 4 more, who had recurrences, were cured by laryngectomy; and Howarth, in 1938, reported no recurrence in 3 to 15 years in 19 of his 25 cases. In 1928, the author reported 76 per cent of his 70 patients operated upon by laryngo-fissure as healthy after three years.

The first laryngectomy was performed by Billroth in 1873, and the first completely successful one by Bottini in 1875. But early cases were generally disastrous. Later, it was realized that complete laryngectomy was particularly indicated for intrinsic cancer in cases where the growth is no longer suitable for the laryngo-fissure operation, and that it is not suited for the majority of cases of extrinsic cancer. By 1909 the percentage of lasting cures from laryngectomy, as reported by Crile, had risen to 66.67 per cent. Apparently there has not since been any appreciable improvement in these figures.

Lateral pharyngotomy is occasionally suitable for growths in the epiglottis, the ary-epiglottic fold, the lateral wall of the pharynx and hypo-pharyngeal type growing from the posterior surface of the cricoid. Of this work Colledge gives his latest (1938) results as 13 cures in 39 cases of pharyngotomy, and 6 cures out of 16 pharyngo-laryngectomies, and says the operation has succeeded even in some cases after the failure of radiation. Gland infiltration, according to Beck, makes for a hopeless prognosis. There have, however, been some successes after removal of invaded glands, reported by Crile, Trotter, Colledge and the author.

The type of laryngeal cancer in which treatment by radium and x-ray therapy promises most (*i.e.*, intrinsic cancer limited to one chord) is just that in which the lasting benefit of surgery is well established.

Where 9 cases of intrinsic cancer, without infiltration of glands, were treated with radium needles by Colledge the cures were three—a poor showing beside 80 per cent lasting cures by laryngo-fissure. Holt Diggle had 77.8 per cent, not recurring in 3 to 6 years. On the whole radiation treatment requires much further investigation, and in most cases surgery must be given preference.

E. A. STUART

Anæsthesia

Concerning the Mechanism of Anæsthesia: Accidents in Sublingual Phlegmons. Weese, H.: *Current Res. in Anæsth. & Analgesia*, 1939, 18: 15.

Two years after evipan was introduced as an intravenous anæsthetic a series of unexplained accidents occurred accompanying its use in operations on sublingual phlegmons, tonsillar abscesses, purulent processes in the area of the parotid gland, the floor of the mouth and the anterior cervical triangle. The common characteristic of these accidents was cessation of

respiration, which occurred particularly in the case of sublingual phlegmons. Some of the accidents were due to laryngospasm or acute oedema of the glottis, that is, to purely mechanical factors, but there were a large number of these accidents in which regardless of a free air-passage a central, generally irreversible, respiratory failure occurred suddenly during the injection. Such accidents take place only in isolated cases under inhalational anæsthesia. Their repeated occurrence during intravenous anæsthesia was so surprising that it was believed to be due to a specific action of evipal soluble. However, as it became apparent that they occurred likewise with other intravenous barbituric acid preparations, the problem was to determine whether the accidents were characteristic of intravenous anæsthesia, that is, of the procedure itself, or of the barbituric acid compound alone.

A series of experiments were carried out on dogs in which abscesses in the carotid bifurcations of one side were produced with turpentine oil injections. If anæsthesia was produced with evipal soluble, and light pressure was applied on the abscess *immediately* after the injection, respiratory failure developed forthwith. Neither analeptics nor prolonged artificial respiration counteracted the failure. The longer one waited after the injection had been commenced before applying pressure to the abscess, the less was the effect on the respiration in depressing it. If one waited until four minutes after injection there was only a minimal effect on the respiration. After eleven minutes no change in respiratory frequency was noted. Hence the longer one waits after injection before exerting pressure, the less will be the inhibitory effect on the respiration.

The rapidity with which the respiration and blood pressure responded to pressure stimulus, as well as the fact that only the affected side reacted under the conditions of the experiment, pressure on the normal carotid bifurcation producing little or no effect, it was concluded that one was dealing with a reflex. Subsequently the carotid bifurcation was denervated on one side before inciting abscess formation on the same side. Subsequent pressure on the abscess over the denervated carotid bifurcation was not followed by the characteristic depression. Hence the reflex response was completely abolished.

The apparent explanation is that if an abscess develops in the area of the carotid sinus the nerve elements become more sensitive than normally when a certain stage of inflammation is reached. Should one then stimulate the nerve elements, the physiological inhibition on the respiratory centre, which continually acts on the centre through perceptive nerves from the carotid bifurcation, will be greatly intensified. Consequently pressure on such an altered area gives rise to a temporary or permanent respiratory failure instead of only a transitory inhibition. However this hypersensitivity diminishes

during the course of anaesthesia as these nerves become completely anaesthetized. Hence the importance, as the author points out, of waiting five or more minutes after the injection of an intravenous anaesthetic before doing surgical interference in sublingual phlegmons or abscesses in the anterior cervical triangle.

F. ARTHUR H. WILKINSON

Obituaries

Dr. Seymour Archibald, of Edmonton, aged 63, died suddenly on May 5, 1939, after a heart seizure. Born in Musquodoboit, N.S., he was widely known as district medical officer for the Canadian Pacific Railway for 40 years and chief medical officer of the Northern Alberta Railways. He served overseas with the Canadian Army Medical Corps as a captain.

Maurice Brodie, B.Sc., M.D., C.M., of Detroit, Mich., died on May 9, 1939.

Dr. Brodie was born in 1903 in Liverpool, England, and came to Canada at the age of eight. He received his primary education in Ottawa and studied science and medicine at McGill, graduating as a Holmes Gold Medalist in 1927. After graduation he served his internship at the Royal Victoria Hospital. His work on the neurological service of Dr. Penfield opened new vistas of thought to him and he became interested in poliomyelitis. For the next six years he was engaged in the study of this subject, first in the Department of Experimental Medicine at McGill University and later in the Department of Bacteriology of New York University and Bellevue Hospital Medical School and the Bureau of Health laboratories in New York city. His efforts were directed towards the development of active immunity in poliomyelitis. In 1935, he described his vaccine "As probably a perfectly safe vaccine" which after two doses in children produced a very definite anti-body response lasting eight months, "Whether or not sufficient and permanent protection is afforded must await further study." Further study, however, resulted in the conclusion that the vaccine was not as yet perfectly safe. His grief and disappointment were great, but his hope was still greater. Unfortunately sudden death from coronary thrombosis cut short his promising work.

Maurice Brodie was unassuming, pleasant and possessed a lovable personality. In his death his parents have lost a devoted son, his wife, a good husband, his brothers and sisters, a kind brother, his friends, a great friend, and science, a keen student.

Dr. Andrew Malcolm Brown, of Markdale, Ont., died on May 3, 1939. He was a graduate of the University of Toronto (M.B., 1902).

Dr. William Alfred Cerswell, of Toronto, died on April 30, 1939, in his sixty-third year. He had practised in Toronto for nearly forty years.

Dr. Cerswell was a son of the late Andrew and Mrs. Cerswell. Born in Bond Head, Ont., he received his early education in Bradford high school and his degree of medicine at the University of Toronto (1901). He did post-graduate work in Toronto hospitals and abroad (L.R.C.P. and M.R.C.S., 1902) until he located at Dovercourt Road. Dr. Cerswell, who specialized in surgery, was for many years on the staff of the former Grace Hospital, and latterly had been a member of the staff of the Western Hospital.

Dr. Edward Bremner Chandler, of Montreal, died suddenly on May 12, 1939. He was the only son of the late Dr. Edward Botsford Chandler, of Moncton,

N.B., and Mrs. Chandler, Montreal. He was born in Moncton in 1896, and educated at Ridley College, St. Catharines, Ont. He graduated from McGill in 1921 and after post-graduate studies he became attached to the attending staff of the General Hospital. At the time of his death he was on the surgical staff of the hospital, and was also on the teaching staff of McGill. He was medical examiner to the Bell Telephone Company for several years.

Dr. Alexander William Chisholm died at his home in Margaree Harbour, N.S., on May 4, 1939, at the age of 72. Dr. Chisholm was a native of Margaree where he received his early education. After spending some years at St. Francis Xavier University and Dalhousie, he entered the Physicians' and Surgeons' College in Baltimore, graduating in 1894. From then until three years ago, when he retired, Dr. Chisholm practised his profession in the Margaree valley. In addition he was for eighteen years a member of the House of Commons, representing Inverness County.

Dr. Thomas A. Cohoe, of Pilot Mound, Man., died on April 21, 1939. He was born at Clear Springs, Man., in 1879 and a graduate of the University of Manitoba (1905). He had practised at Pilot Mound since 1904.

Dr. Andrew William Dwyre, of Perth, Ont., died on April 27, 1939, in his seventy-ninth year. On April 27, 1935, he completed 50 years as a medical practitioner, at which time he was tendered a complimentary banquet by the Lanark County Medical Association and presented with a gold-headed cane and a silver rose bowl.

Dr. Dwyre was born on a farm in the township of South Crosby in Leeds County, near the village of Elgin, of Irish parents, a son of the late Andrew Dwyre and his wife Catherine Kelly. Educated in rural schools and in the Elgin public school and in the Farmerville (now Athens) high school. He graduated at Queen's University (1885) and immediately began practising in the village of Westport and came to Perth in 1886. In 1901 he was appointed by the Separate School Board as its representative on the board of education and continuously until his demise discharged various duties of that body. Twice he was honoured with the chairmanship of the board, in 1915 and again in 1928. In 1900 he was appointed a coroner of Lanark County.

Dr. John Murray Eaton, of Toronto, formerly of Carberry and Winnipeg, Man., died on April 8, 1939, in his 82nd year. He graduated from Trinity University (1888). Since his retirement in 1912 he had lived in Toronto.

Dr. Henry Herbert Elliott, former Commissioner of Manitoba, died at The Pas, Manitoba, on April 24th, in his 67th year. He was born at Bayfield, Ont.; graduated from Queen's University in Medicine in 1898; practised in Seeley's Bay, Ont., till 1912. In that year he came to The Pas to open up the out-post customs service. In 1918 he went to Emerson in charge of port customs; resigned in 1920, and went to Rapid City, where he resided till 1925, when he was appointed Commissioner to Northern Manitoba.

Dr. Oscar Guimot, of Quebec, one time head of that city's medical research laboratory, died on May 10, 1939, aged sixty-four. He was a graduate of Laval University, Quebec, 1895.

Dr. Frederick James Hosking, of Hillsdale, Ont., died by accident on May 14, 1939. He was thirty-three years old. Born in Vermont, Dr. Hosking came to Canada at the age of six and lived in Rockwood, Ont., most of his life. After graduating from the University of Toronto, where he gained recognition as a wrestler and

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swimmer, he was intern for a year at Hamilton General Hospital.

Dr. Robert Alexander Kennedy, who practised medicine in Ottawa and Rockland for 44 years prior to his retirement in 1930, died on April 27, 1939 at Orillia, Ont. He was in his 80th year. Born at Uxbridge, Ont., Dr. Kennedy was a son of the late Samuel M. Kennedy and Jane Black. He graduated in arts from McGill in 1884 and in medicine in 1886.

During the Great War, Dr. Kennedy served overseas for three years with the Canadian Army Medical Corps. In his graduation year at McGill he was a member of the college football team.

Dr. Charles Lafleur, physician of the Montreal Fire Department for the past 35 years, died on March 31, 1939. He was in his 61st year and had been in practice for 36 years.

Dr. Lafleur was a native of Montreal and graduated from the Laval School of Medicine, Montreal in 1908.

Dr. Charles Baldwin Langford, of Blenheim, Ont., died on April 1, 1939. He was a graduate of the University of Toronto (M.B., 1888) and of Victoria University (M.D., C.M. 1888) and was an intern at the Toronto General Hospital for a year after graduation.

Dr. Langford had been a medical practitioner in Blenheim for fifty years. He was born in Kent Bridge, in the year 1867, the son of the late Mr. and Mrs. John Langford. He attended the Kent Bridge public school and matriculated in the Jarvis Street Collegiate Institute, Toronto.

Dr. F. G. Logie, of Vancouver, died recently. He was a graduate of McGill University (1907). Dr. Logie was a member of a well-known New Brunswick family—two of his brothers are medical men. He was very popular with his colleagues and his death is a distinct loss to the medical profession in Vancouver.

Dr. Willis B. Moore, of Kentville, N.S., died at the Victoria General Hospital, Halifax, on April 13, 1939. He was eighty-four years of age. His early education was received at Horton and Pictou Academies. Dr. Moore was the oldest living graduate of the Dalhousie Medical School from which he obtained his degree in 1879. Leaving Dalhousie, he took up practice in Kentville, the town of his birth, where he served until his retirement twenty years ago. In recent years Dr. Moore devoted his time to hunting and fishing, and to extensive travels which carried him all over the earth. Death brought to an end a full, well-rounded life.

Dr. John Isaac Pratt, of Port Arthur, Ont., died on May 3, 1939. He was born in Aberdeen, Scotland, in 1873 and came to Canada in 1886. He graduated from the University of Toronto in 1895. He practised first in Coldsprings, Ont., then went to London and obtained his M.R.C.S. and L.R.C.P. in 1902. He spent a year as ship's surgeon on the P. & O. Steam Navigation Company's boats between London and the Orient, and began practice in Port Arthur in 1904.

In the death of Dr. Pratt his patients and his fellow practitioners have suffered a great loss. He took an active part in organized medicine, was a charter member of the Thunder Bay Medical Society, a Past-president of the Society, and was for a number of years a Councillor of the Ontario Medical Society.

Dr. Pratt founded the Port Arthur Clinic in 1926 and was instrumental in building an up-to-date building for that organization in 1930.

Dr. Ernest George Simmonds, of the Ponoka Mental Hospital staff, died in Edmonton, Alta., on April 13, 1939.

Dr. Thomas F. Sprague, of Woodstock, N.B., died on April 21st. He had been in ill health for several months, a good portion of this time being confined to

his home. Dr. Sprague was born in Brigus, Nfld., August 30, 1856. He graduated from the University of New York (1880). He had practised in Welsford, Hartland and Woodstock and was attached to the Fisher Memorial Hospital at Woodstock, as anaesthetist, until about a year ago. Dr. Sprague was one of the oldest physicians in New Brunswick.

News Items

Alberta

The Creditor Arrangement Act is working a hardship on the physician who has no security for payment for services. In the actual working out the average medical account might be better left unrepresented when one considers the costs of the affidavit. One physician presented 200 accounts with paid affidavits, and so far, in three years, received one payment of sixty-two cents, but he is promised a second payment next year of sixty-three cents.

The idea is spread of having health societies contract with a physician for a stipulated amount per family, under a guarantee that the number of families to be served shall not be under a fixed limit, and then contracting with the individual to receive and pay for that service. Some features are undesirable, viz., the contract is with a single doctor; when there are several others working in the field, the officers of the society are advance solicitors for the contracts, which means canvassing agents for the single doctor. Though his name does not appear on the contract with the patient, his name is mentioned at the time the contract is solicited and his virtues are lauded. All this may indicate a trend—so one asks where does it all lead?

The President-elect, Dr. L. J. O'Brien, the Honorary Secretary, and two clinicians are visiting the annual meetings of the District Associations, when a business and scientific program will be carried out at each of the following places: Red Deer, Calgary, Drumheller, Lethbridge and Medicine Hat. The clinicians are Dr. J. W. Richardson, surgeon, and Dr. H. N. Jennings, physician. It is planned also, to have someone from the Cancer Control Society go along and arrange for cancer-study groups in the various hospitals. G. E. LEARMONTH

British Columbia

The Annual Meeting of the Vancouver Medical Association took the form of a Dinner Meeting on April 25th and was well attended. The guest of the evening was Dr. T. A. Rickard, D.Sc., Mining Engineer, who gave a most interesting and original address on "The romance of mining". His analysis of the Golden Fleece Legend of ancient days as one of the earliest examples of prospecting for gold and his references to the quest for the yellow metal followed by Spaniards and Englishmen from South America, together with many other features of his address, made the speech a memorable one.

The following were elected as officers of the Association for the coming year: *President*, Dr. A. M. Agnew; *Vice-President*, Dr. D. F. Busted; *Honorary Secretary*, Dr. W. M. Paton; *Treasurer*, Dr. W. T. Lockhart.

The City of Vancouver is holding an election on May 10th for the office of an alderman to the City Council to replace Alderman Fred Crone who died recently. At this election a plebiscite will be held to determine whether Daylight Saving will be adopted by the City or not. A very large vote is expected and both sides of the argument have been very vocal and active in presenting their reasons for and against. The chief opposition to the move seems to come from certain in-

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dustries which cater to evening entertainment and also from a section of labour. The Vancouver Medical Association publically endorsed Daylight Saving as a health measure.

J. H. MACDERMOT

Manitoba

By a vote of 30 to 17 the Legislature of Manitoba gave a six months' hoist to a bill introduced by L. St. G. Stubbs to admit to medical practice in Manitoba an Austrian Jewish refugee, Dr. Georg Kimel. Voices were raised as members argued the merits of discretionary powers exercised by the College of Physicians and Surgeons. A full attendance in the public galleries followed the debate with deep interest. The case has been widely discussed. It is unfortunate that Dr. Kimel yielded to the importunities of his lay friends and allowed a special bill to be brought in instead of taking the advice of his medical friends, who had counselled delay until he had acquired some knowledge of the English language and could be granted a licence in the authorized way.

The Sisters of St. Boniface Hospital are contemplating an addition of one storey to the St. Boniface Sanatorium.

Dr. A. J. Douglas, retiring medical health officer of Winnipeg, was tendered a farewell luncheon on April 28th, at the Royal Alexandra Hotel, by the civic department and sub-department heads. During the meeting a handsome desk set of Manitoba marble surmounted by a bronze buffalo was presented to Dr. Douglas by Jules Prud'homme, K.C., City Solicitor. Dr. Douglas has been Medical Health Officer for nearly 40 years and has set up a most enviable record of efficient service.

ROSS MITCHELL

New Brunswick

Dr. M. L. Jewett, of Millville, N.B., suffered very serious spinal injuries at his home on May 2nd. Dr. Jewett is confined to the hospital at Fredericton and his condition is considered serious.

Dr. J. R. Nugent has been appointed as Grand Counsellor on the Canadian Society for the Control of Cancer to complete the term of Dr. A. E. Macaulay who was forced to resign by press of personal affairs.

Dr. H. A. Farris and Dr. W. O. McDonald, of Saint John, attended the meeting of the American College of Physicians at New Orleans.

Dr. A. A. G. Corbet was recently elected president of the Saint John branch of the Red Cross Society.

Dr. A. L. Gerow, of Fredericton, met with an accident in which he fractured several ribs. He has been confined to his home since.

Dr. F. R. Connell was dined by his colleagues in Saint John at the last regular meeting of the Saint John Medical Society in honour of his approaching marriage.

There has been a small, severe epidemic of typhoid fever on the North Shore of New Brunswick, several deaths having already resulted. The epidemic was traced to a polluted water supply obtained from a neighbourhood well.

There still continues to be a fair amount of scarlet fever throughout the province, but at the moment no schools have been closed.

A. STANLEY KIRKLAND

Nova Scotia

Examination of a hundred school children in North Sydney by Dr. C. J. W. Beckwith, Divisional Medical Health Officer, with the assistance of the I.O.D.E. marked the opening of a search for unrecognized tuberculosis in the schools of that locality. Tuberculin tests have been given, and it is planned to use fluoroscopic examination as a further check.

Dr. F. J. Granville has moved to Stellarton, to take over the practice of the late Dr. Whitman.

The administration of diphtheria toxoid to school children has been begun at special clinics in Antigonish and North Sydney.

Dr. Donald M. MacRae, of Halifax, has become associated with the partnership of Dr. Evatt Mathers, Dr. Arthur E. Doull and Dr. A. Ernest Doull, where he will continue his practice in oto-laryngology.

ARTHUR L. MURPHY

Ontario

Doctor G. E. Eakins, of Port Arthur, was elected President of the College of Physicians and Surgeons of Ontario at its annual meeting in April.

Doctor H. Beaumont Small, one of the most distinguished members of the medical profession in Ottawa and well-known for his activities in the Canadian Medical Association and other organizations, celebrated his 85th birthday in April.

Doctor Miles G. Brown has been appointed Superintendent of the Hamilton General Hospital, succeeding Dr. W. F. Langrill, effective, October 1st.

Attacked on the ground that its proposals were too far in advance of public opinion, not yet sufficiently educated on the problem of social diseases, David J. Croll's bill before the Ontario Legislature was defeated in its second reading. The Bill required that parties to a proposed marriage must produce medical certificates testifying that they were free from evidence of venereal disease.

At the annual meeting of the Ontario Hospital Association, Dr. L. C. Fallis of London was elected President.

Dr. D. A. Scott, of the Connaught Laboratories of the University of Toronto, addressed the Division of Medicinal Chemistry of the American Chemical Society at its 97th meeting on crystalline insulin.

Dr. H. C. P. Hazelwood has been appointed Physician-in-Chief of Muskoka Hospital for Consumptives at Gravenhurst, where he has been on the staff for many years assistant to Dr. W. B. Kendall, recently retired.

Fellowship in the American College of Physicians has been granted to Lieut.-Col. R. J. Gordon, pensions medical examiner of the Canadian Pensions Commission, London, Ont., and to Dr. L. J. Solway, M.B.C.P., Chief of the Medical Service, Mount Sinai Hospital, Toronto. Dr. Solway's friends and confrères marked his elevation by a testimonial dinner at the Royal York Hotel, April 18th.

At a recent meeting of the Health League of Canada, a special committee was named to get underway a drive to raise \$50,000.00 toward a campaign fund.

The Department of Pensions and National Health has completed arrangements for Canadian hospitals to take advantage of the benefaction of Lord Nuffield who recently offered to provide an "iron lung" for every hospital of the British Empire. Since the "iron lung"

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is a gift, the only expense is in transportation from the Nuffield works at Cowley, England, to Canada.

In the Premier's budget speech it was announced that additional buildings will be undertaken almost immediately at the new Ontario Mental Hospital at Brampton. In the year just past, a little under \$5,000,000 was added to the provincial debt for the construction of mental institutions. The budget forecast reveals that the Department of Public Works expects to spend almost the same sum this year.

In speaking of tuberculosis, the Premier stated more money was spent in 1938 in preventive and curative work than ever before. The six travelling clinics conducted 152 local clinics examining 13,600 patients at a cost of \$85,000. Seven hundred and seven new cases of tuberculosis were found and sanatorium beds increased from 3,285 to 3,700. Toward the maintenance of patients in sanatoria the province paid \$1,136,592, as against \$671,000 the previous year.

The Hamilton Academy of Medicine, after full investigation, has decided to establish a branch of the Associated Medical Services.

One of Ontario's oldest medical officers, Dr. A. R. Hanks (Trinity '85), who resigned his duties March 1st, was the guest at a testimonial banquet in Blenheim, Ont., at which he was the recipient of a gold-headed cane.

The Hotel-Dieu, Windsor, launched last month a short drive, to raise \$50,000 for their building fund.

On May 1st the Property Commission of the City of Toronto announced a war on ragweed with an army of 500 men and an expenditure of over \$100,000, in an endeavour to get rid of the weed from city and privately owned property.

A statement has appeared that a special committee of the Ontario College of Physicians and Surgeons will shortly consider a number of applications from medical men from Czechoslovakia and other European countries who wish to practise in this province.

Dr. O. M. Solandt, of the Best Medical Research Department, University of Toronto, has been appointed university lecturer in mammalian physiology in Cambridge University, England.

Under the auspices of the Academy of Medicine, Toronto, Dr. Edward A. Strecker, Professor of Psychiatry, University of Pennsylvania, gave a condensation of the Salmon Memorial Lectures on Psychiatry and Mental Hygiene in an address entitled "Beyond the clinical frontiers—application and relationship of psychiatry to every-day life", in Toronto on May 5, 1939, in Convocation Hall, University of Toronto. This was a very interesting and instructive lecture and was well attended by members of the medical, nursing and teaching professions.

The British Medical Research Council announce a new journal *The British Journal of Endocrinology* with Professor E. C. Dodds as Editor. The Assistant Editor is Dr. R. L. Noble (Toronto, '34). J. H. ELLIOT

Quebec

Dr. Campbell McGregor Gardner, a young Montreal surgeon, has been made a Fellow of the Royal College of Surgeons, England. Dr. Gardner intends doing further post-graduate work in Stockholm, Sweden, before returning to Montreal about mid-summer.

Born in Montreal in 1907, Dr. Gardner is the son of J. G. Gardner, D.D.S., of Lennoxville, and Elizabeth McGregor, one of the early graduates of McGill University. Following his graduation from McGill in 1931, he was an intern at the Montreal General Hospital

until 1935, after which he spent a year in study abroad, obtaining his junior F.R.C.S. in 1936. In 1935 he was appointed to the attending staff of the General Hospital as junior assistant in surgery, and in June, 1937, was promoted to the post of clinical assistant in the same department.

Saskatchewan

Regina is holding a Refresher Course on June 15th 16th and 17th at the Regina General Hospital and the Regina Grey Nun's Hospital. Speakers are coming all the way from Moose Jaw, Edmonton, Winnipeg and Vancouver. The course consists of discussions, demonstrations and formal papers on a variety of topics and is embellished by luncheon talks by eminent lay speakers. One notes the enthusiasm which must have filled the committee, for the days' work is scheduled to begin at 7.30 a.m. and, on one day, at 7.15. The subjects chosen are of wide range, and should prove most helpful.

LILLIAN A. CHASE

General

Civil Service of Canada.—Chief of Laboratory of Hygiene, male, is required for the Department of Pensions and National Health, Ottawa. Salary offered \$6,000.00 per annum. Full particulars as to duties, qualifications required, and examinations can be obtained from the Department. Application forms properly filled in must be filed with the Civil Service Commission, Ottawa, Ont., not later than June 9, 1939. Application forms are obtainable at all City Post Offices, the Post Offices in the larger towns, the Offices of the Employment Service of Canada, or from the Civil Service Commission. Please quote competition number 28841 when filling out application form.

Book Reviews

Classified Bibliography of Sir William Osler. Edited by M. E. Abbott. 2nd ed., 163 pp. \$2.25. Copies may be obtained from the author, Medical Museum, McGill University, Montreal, 1939.

It is difficult not to expand on a bibliography such as this. That seems to be the inevitable result of contact with anything pertaining to Osler. He opened so much inquiry and left so vigorous a stimulus that these effects are yet far from being spent. This bibliography is re-edited after a long interval and in a form which makes it more effective. It appeared first as an appendage of the memorial volume to Sir William, which made something of an *embarras de richesse*, especially as there was in it an additional bibliography of writings about Osler. One entirely agrees with Mr. Gibson's reflection that the things said about Osler, nice as they may be, tend to obscure the things written by him. Here, however, the lines of the monument are more clearly cut. The book is greatly improved by the addition of an index.

We owe all this to Dr. Maude Abbott's industry. That she should continue to exhibit it in defiance of so many and great dangers—for her accidents are fast becoming a habit—commands our respect almost to the point of awe. Hardly less notable is the patience of the Murray Printing Company in holding the bibliography in type for so many years. The fund which has helped it financially was given by the late Mrs. R. W. Reford, Senior, in 1920, and has already helped the publication of the Osler Memorial Number of the *Canadian Medical Association Journal* in 1920 and Dr. Abbott's Osler Memorial Volume of the Museums Association, 1926. The remainder of the fund, together with any profits from the present publication, will be devoted to the publication of a descriptive catalogue of Osler's pathological collection, now housed under Dr. Abbott's care in the McGill Medical Museum.

A bibliography permits of little criticism, except in its technical aspects, which only such people as librarians

In Obstetrical and Surgical Practice

Pituitary Extract (posterior lobe), an aqueous preparation derived from the separated posterior lobe of the pituitary gland, holds a well-recognized place in materia medica.

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understand. To the reader who wants to know what Osler did all his writing about this book will be found entirely satisfying.

The Clinical Diagnosis of Swellings. C. E. Corrigan. 303 pp., illust. \$4.00. Williams & Wilkins, Baltimore, 1939.

This book on a clearly-cut clinical basis is one from a Canadian writer practising in Canada. It is essentially a clinical book with two basic principles: clinical methods only are used in the examination of swellings and physical signs are allotted precedence over history and symptomatology. "One sign is worth ten symptoms"; "Direct your questions to the swellings themselves, rather than to the patient, and the answers received will be more concise, less circumstantial and more dependable".

The book is printed in moderate sized print, on good paper. The illustrations are sufficient to depict the pathology. One unusual feature is the biographical reference list at the termination of each chapter.

This type of book is unique inasmuch as its value is unquestioned in diagnosis, and to separate the technique of examination from history and symptoms brings much more clarity to a field of clinical material in which the patient's opinion and the surgeon's diagnosis are so often at variance. He gives the general examination of swellings, discusses each clinical sign from the pathological viewpoint and later proceeds to elaborate upon the various types of swellings in each part of the body. There is a philosophical value to the younger clinician as well as a practical one.

Chronic Diseases of the Abdomen. C. J. Marshall, M.S., M.D., F.R.C.S. 247 pp., illust. 25s. Chapman & Hall, London, 1938.

The author is well qualified to write this valuable book on the diagnosis of chronic diseases of the abdomen. One suspects that his training in medicine has given him a conservative view of surgery. The book is arranged in sections, the first of which deals in a very thorough manner with examination, both clinical and special. The second edition, arranged in a number of broad subdivisions, takes up differential diagnosis. Mr. Marshall makes considerable use of what he terms the "dangle" position, which manoeuvre involves seating the patient on a stool so that he leans well forward, flexing his abdomen toward the thighs. Relaxation is encouraged by allowing the arms to hang down or "dangle" at the sides. Standing behind the patient, the examiner palpates the abdomen with both hands during full expiration and inspiration. Many other valuable hints are given, for instance, "inexplicable thromboses without inflammatory reaction are suggestive of the presence somewhere in the body of carcinoma". The book is up-to-date, with pertinent remarks on gastroscopy, Walters' conception of pain following cholecystectomy, and other recent advances in diagnosis. The symptomatology of cardiospasm, however, is not well described, nor is there mention of Meckel's diverticulum as a cause of melæna. These are after all trivial defects, and do not detract at all from the value of the work. This book should be read from cover to cover by every intern and young practitioner, particularly the first section dealing with clinical examination. It should prove a valuable book of ready reference to any practising physician or surgeon.

A Textbook of Neuro-radiology. C. P. G. Wakeley and A. Orley. 336 pp., illust. \$7.50. Macmillan, Toronto, 1938.

In the recent advance of neurology and of neurosurgery radiology has played a significant rôle. It is therefore timely that a volume should appear upon this subject. The present volume has been composed conjointly by a radiologist and a surgeon. It is divided into numerous short chapters and subsections. The first portion of the volume is concerned with the

technique of plain radiography of the skull, including position and projection for the visualization of special regions and foramina; followed by chapters dealing with skull deformity, trauma and disease. This is followed by a consideration of intracranial lesions from the point of view of radiography; with excellent but brief accounts of related clinical data. Included are chapters upon non-pathological deposits of calcium; the various types of known intracranial lesions including neoplasm; changes found in increase of intracranial pressure; certain miscellaneous conditions and lesions affecting the sella turcica. The final third of the volume is devoted principally to a study of special topics: the cerebral circulation and angiography; the cerebrospinal fluid system; ventriculography and encephalography; lesions and anomalies of the vertebral column and spinal cord which includes myelography. There is a good bibliography.

The whole work is most concisely and clearly written and, so far as it goes, seems accurate and authoritative. It is rather well illustrated and the print is of large type. The headings of chapters in the table of contents seem to be confused with headings for subsections, which does not detract from the value of the work. It is brief, but the pertinent clinical points seem accurately accounted for.

Clinical Pædiatrics. "The Baby". Edited by W. R. F. Collis, M.A., M.D., F.R.C.P., F.R.C.P.I., D.Ph. 460 pp., illust. \$6.25. Macmillan, Toronto, 1938.

This book makes a serious and creditable attempt to bridge the gap between the obstetrician and the pædiatrist. It is therefore of equal value to both, as well as to the general practitioner, who on many occasions has to perform trable duties. To the last it probably will prove of the greatest value, particularly since it draws the attention of the reader to conditions with which he may not be familiar or think unimportant and which may have a marked bearing on the entire lifetime of the child.

The book is divided into ten sections. Section One is more or less introductory, and general subjects such as immunity, control of infections, vital statistics, growth and development of a normal child are grouped. This lays the foundation for the more special subject and gives the reader knowledge that he may appreciate what should be the expected normal course of events.

The second section is of vital interest. A complete familiarity with these chapters will give immediate advice which is necessary in order that the baby may have a chance to even live. How few practitioners have even a minor knowledge of what to do for the premature baby! The best methods of resuscitation for the new-born are dealt with. The first few minutes and days of the baby are of extreme importance.

The Third section has the task of mapping the feeding regimen of both the breast and artificially fed baby. This section may be disappointing to the practitioner trained on the American side of the Atlantic. The advice differs considerably from the routine practised by the American pædiatrist. The old form of three hour feedings is followed, and no attempt is made to lessen the number of feedings until the child is nine months. No forms of food containing other than high carbohydrates are added to any extent until after this period. The general routine followed is of value, however, and here there is merely a difference of opinion.

Section Four reviews to date the infectious diseases and their prevention by producing artificial immunity. The diseases, such as those of the heart, lungs, intestinal tract and others of a non-specific nature, that is, those not requiring the care of a specialist, are interestingly presented.

The remaining sections from five to nine deal with the specialties such as neurology, dermatology, surgery, etc., and are of more value as a reference since most of the subjects are dealt with very briefly.

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SUPERVISED READING in preparation for the F.R.C.S. (Canada) examination is now being conducted to prepare candidates for the eight weeks' intensive clinical review that will be held by permission at the Montreal General Hospital, beginning August 29th, 1939. Applications to Dr. R. R. Fitzgerald, Montreal General Hospital.

MUNICIPAL DOCTOR WANTED.—Rural population about 1,500, also two villages, and a hamlet. Red Cross Outpost Hospital in one village. Write stating qualification and experience, and salary required. Any information regarding contract etc., given upon request. Rural Municipality of Poplar Valley No. 12, Wm. J. Kyle, Sec.-Treasurer, Constance, Sask.

WANTED.—A well trained general practitioner McGill Graduate 1932 desires assistantship, location or locum tenens. Apply Box 329, Canadian Medical Association Journal, 3640 University Street, Montreal.

LOCUM TENENS or assistantship wanted for July, August and September by graduate in Arts and Medicine with two years' hospital experience, who is doing further post-graduate work in the fall. Apply Box No. 330, Canadian Medical Association Journal, 3640 University Street, Montreal.

WANTED.—Experienced graduate masseur with knowledge of Electrotherapy and Hydrotherapy desires position in Hospital, Sanatorium or Doctor's Office. Thorough training in the College of Swedish Massage. Canadian. Excellent references. B. H. Stromquest, Fort Dearborn Hotel, Chicago, Ill.

WANTED—ADVERTISING MANAGER for eastern Canada drug manufacturer. Thorough command spoken and written French pharmaceutical terminology required. Salary open: two medical detailers, Toronto, Montreal. Medical training and knowledge of endocrinology preferred. Under 35. Good salary and expenses. American Company. Apply, Everett Brown Agency, 17 John Street, New York, U.S.A.

FOR SALE.—Widow of recently deceased physician who for twenty years has practised in small town in western Ontario, wishes to dispose of equipment, furniture and drugs. Office rooms in central location offered for rental. Medical books and instruments optional. Town of 1,800 with prosperous country practice. For sentimental reasons will make terms very favourable. Further particulars from C. A. G. Matthews, 1189 Yonge Street, Toronto, K1. 6108.

All illustrations are remarkably clear, well chosen and beautifully reproduced. There are many points of extreme interest and value throughout the book.

Practical Otology. M. Levine, M.D., F.I.C.S. 2nd ed., 416 pp., illust. \$5.50. Lea & Febiger, Philadelphia, 1938.

This book, as Dr. Levine says in the preface, presents essentially a compilation of his lectures on Otology given at the New York Post-Graduate Medical School of Columbia University. He has wisely devoted considerable space to the anatomy and physiology of the ear and also to the functional examination of the cochlea and equilibratory apparatus. The infections of middle ear and mastoid and also the intracranial complications are covered in a practical manner. He has included a chapter on petrositis, without going into the details of surgical treatment. The question of allergy in its relation to ear conditions is discussed as well as the ear-disturbances arising in connection with aviation. Throughout the book treatment has been stressed. This book is a good practical guide to the student and also the general practitioner in his everyday problems. To the specialist in otology it should be of assistance not only as a reference but also in preparing lectures for students.

A Manual of Reparative Plastic Surgery. J. E. Sheehan, M.D., F.A.C.S. 311 pp., illust. \$5.50. P. B. Hoeber, New York, 1938.

This manual is a further addition to the books published on plastic surgery. The author has gone to considerable pains to outline in detail the methods that he advises. In an early chapter, he reviews the modern methods of transferring skin, either by Thiersch graft, full-thickness graft, or pedicle graft, chiefly after the removal of scar tissue following burns. A chapter is devoted to the orbit and is well illustrated, showing most of the recent advancements in the correction of ectropion, entropion, epicanthus, symblepharon, etc. One of the best chapters contains a detailed description of the general methods adopted for the correction of deformities of the nose and is well worth reading carefully. A further chapter is given to the repair of the deformed ear, and the modern methods are briefly described. Cleft palate and harelip reparative surgery is described in some detail, and a good attempt has been made to outline some of the methods for the improvement of the defective harelip nostril. It is impossible in a book of this size to cover all the fields of plastic surgery, but this is a distinct addition to the present literature on reparative surgery.

Physical Diagnosis. R. C. Cabot, M.D. and F. D. Adams, M.D. 12th ed., 846 pp., illust. \$5.00. Williams & Wilkins, Baltimore, 1938.

This book has been considerably enlarged. The addition of a co-author and the incorporation of the experience and views of hospital colleagues has to some extent modified the definite personal atmosphere which characterized previous editions. But the teaching is there still, sound and clear. The addition of the chapter on history-taking is valuable. One may question whether some of the illustrations are worth while. Pictures of instruments are useless, and some of those illustrating disease are not impressive, those of Raynaud's disease for instance.

Biological Standardization of the Vitamins. K. H. Coward, D.Sc. 227 pp. \$3.75. Macmillan, Toronto, 1938.

This book, while written purely for workers who are engaged in the determination of the vitamin potency of foods or for research workers in that line, many physicians interested in this subject will find very instructive. The determination and standardization of the vitamins at present available are treated with great clarity. Many charts and tables add to the book's value. While easier means of standardiza-

tion are sought for in every scientific laboratory working on this fascinating subject this monograph gives all the methods available at present.

Elementary Anatomy and Physiology. J. Whillis. 342 pp. 12s. 6d. J. & A. Churchill, London, 1938.

This book is intended for junior students and combines the anatomy with the physiology of the various systems. The idea of combining the two is excellent but the book endeavours to cover too much in too small a compass. It would be of considerable value to nurses, but it is somewhat too sketchy for the average medical student to rely on alone, though forming an excellent introduction to the subject.

Applied Anatomy. R. H. Miller, M.D. 484 pp., illust. \$6.50. Lea & Febiger, Phila., 1938.

It is difficult to cover such a subject in concise form. Both physiology and anatomy are dealt with, but a good deal has been compressed in a small space. Some of the illustrations might have been omitted. There are good bibliographies at the end of each chapter.

You Can Sleep Well. E. Jacobson, M.D. 269 pp. \$2.00. McGraw-Hill Book Co., New York, 1938.

There is a good deal of verbiage here, but there are also some fairly sound principles regarding relaxation as a method of attaining sleep.

Outline of Roentgen Diagnosis. L. G. Rigler, B.S., M.B., M.D. 212 pp., 225 illust. \$8.00. Without atlas \$4.00. Lippincott, Montreal, 1938.

A condensed text which should be of considerable help to those interested in radiography.

Whitla's Dictionary of Treatment. R. S. Allison, M.D. and C. A. Calvert, M.B. 8th ed., 1285 pp., illust. \$9.00. Macmillan, Toronto, 1938.

This is clearly written and covers a very wide field. It is of value to the general practitioner.

Historical Chronology of Tuberculosis. R. M. Burke, M.D. 84 pp. \$1.50. C. C. Thomas, Springfield, 1938.

A useful little summary of medical history with especial reference to tuberculosis.

Big Fleas Have Little Fleas. R. Hegner. 385 pp., illust. \$3.00. Williams & Wilkins, Baltimore, 1938.

One must know something about protozoa before reading this book, in spite of its apparently light and elementary arrangement. The illustrations are funny to a degree, varied with some more sober in nature. A great deal of miscellaneous information on the common protozoa is contained in the book, and the practising physician will find a good deal to interest him with regard to the diseases caused by them.

BOOKS RECEIVED

Jacob Henle on Miasmata and Contagia. Tr. by George Rosen, M.D. 77 pp. \$1.00. Johns Hopkins Press, Baltimore, 1938.

An Introduction to Physical Anthropology. E. P. Stibbe, F.R.C.S. 230 pp., illust. \$3.25. Longmans, Green & Co., Toronto, 1938.

Studies on the Physiology of the Middle Ear. J. G. Byrne, M.A., M.D., LL.D. 298 pp., illust. 18s. H. K. Lewis, London, 1938.

Cancer Manual. Executive Cancer Committee of Iowa State Medical Society. 169 pp. \$1.00. Athens Press, Iowa City, 1937.

Twenty-Eight Years of Sterilization in California. P. Popenoe and E. S. Gosney. 47 pp. \$0.25. Human Betterment Foundation, Pasadena, 1938.

Biology and Pathology of Tooth and Its Supporting Mechanism. B. Gottlieb and B. Orban. 195 pp., illust. \$5.00. Macmillan, Toronto, 1938.

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Medical Library

The Canadian Medical Association Journal



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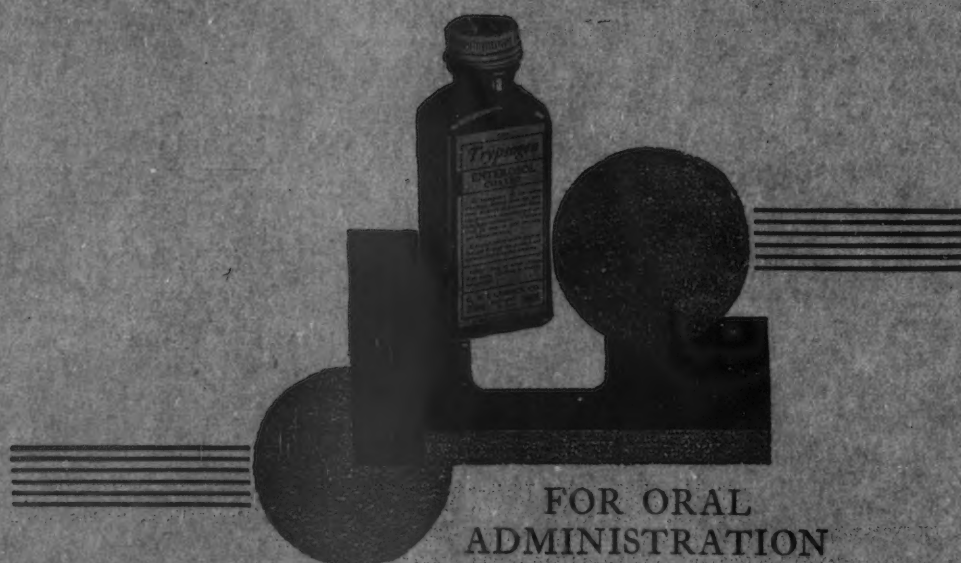
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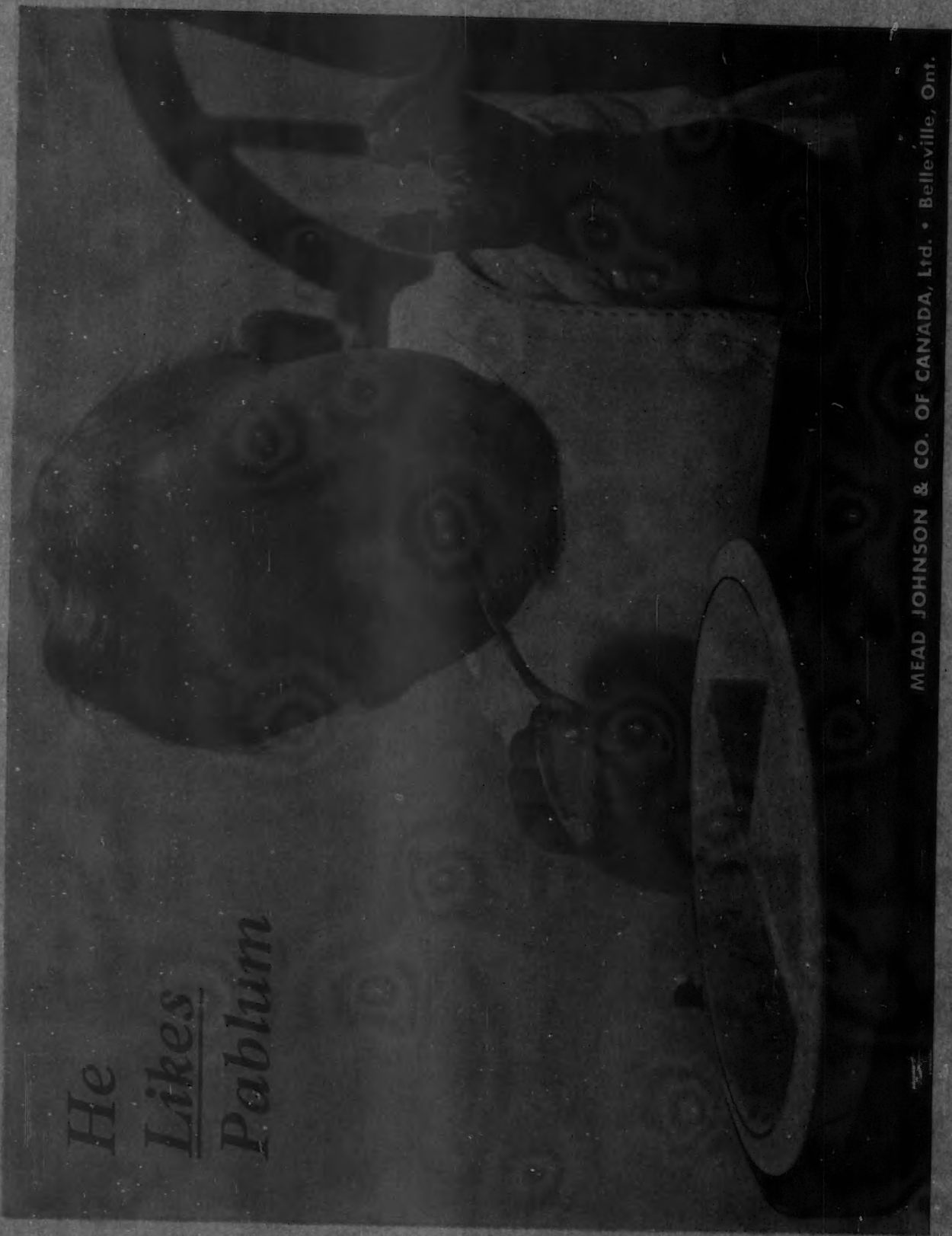
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